

American Reading Forum Online Yearbook



Editorial Board

Editor in Chief

Michael P. French, Lourdes University

Associate Editors:

Anne Chatfield, Randall Middle School Hillsborough County, FL

Anita Gail Choice, Stetson University

Rosalind Gann, East Tennessee University

Lynne Miller, Florida International University

Submissions:

arfyearbook@gmail.com Michael P. French Lourdes University 6832 Convent Blvd Sylvania, Ohio 43560 419.824.3721

mfrench@lourdes.edu

VOLUME XXXI (2011)

2010 KEYNOTE ADDRESSES

Growing Capacity with Literary Vocabulary: The Megaclusters Frameworv Elfrieda H. Hiebert, TextProject & U of California, Santa Cruz

Painted Literacy: Lens and Light Celebrating theTools that Help Us See Text (In three parts)Section ISection ISection IISection II<th

Celebrating the Text We Use: What We Know and How We Know It—A Reaction, Nance S. Wilson, Lourdes University

2010 PAPERS

College Students' Textbook Reading, or Not! Kylie Baier, Bowling Green State University Cindy Hendricks, Bowling Green State University Kiesha Warren Gorden, Ball State University

James E. Hendricks, Ball State University Lessie Cochran, Bowling Green State University

Celebrating What Children Comprehend: Using a Rubric for Written Retellings of Narrative Text Joyce C. Fine, Florida International University Pamela K. Mosser, Broward County Public Schools

"This They Believe": An Examination of the Texts Preservice Teachers Know and How They Know Them.

Penny Soboleski, Bowling Green State University



Using Teacher Observation to Guide Improvements

Nance S. Wilson, Lourdes University

PREVIOUS PAPERS

Adolescents' Developing Literacy: What's the Use of Technology?

Joyce C. Fine, Florida International University Lynne D. Miller, Florida International University Baier, K., Hendricks, C., Warren Gorden, K., Hendricks, J.E., & Cochran, L. (2011). College students' textbook reading, or not! *American Reading Forum Annual Yearbook* [Online], Vol. 31.

College students' textbook reading, or not!

Kylie Baier, Bowling Green State University Cindy Hendricks, Bowling Green State University Kiesha Warren Gorden, Ball State University James E. Hendricks, Ball State University Lessie Cochran, Bowling Green State University

Introduction

College professors often look around a classroom full of blank stares after asking a question that should have been found in the assigned readings. Professors integrate assigned reading into their curriculum in hopes to help students create a deeper understanding of the content and expand their thinking past the surface. However, with fewer students completing their readings, a great deal of knowledge can be lost within the textbooks. Professors carefully collect materials to work succinctly with the content that is being taught in the class. When students do not read or only partially read their assignments their opportunity for growth is severely hindered. It is no secret that college students may not be reading all of their assigned materials, therefore research continues to examine the growing phenomenon, the behaviors of college students, as well as attempt to find solutions to this ever-growing issue. Research on textbook reading has demonstrated the importance of integrating supplemental texts into the classroom to enhance learning. Instructors locate materials to allow students to create a deeper meaning of the course content; however, there has been a growing trend of students who are not compliant with completing class readings (Burchfield & Sappington, 2000). Although students may believe the course textbook plays an integral role not only in understanding course content, but also with the course learning experience (Beeser, Stone, & Nan, 1999), low numbers of students are completing their assigned readings before class (Burchfield & Sappington; Clump, Bauer, & Bradley, 2004; Clump & Doll, 2007; Phillips & Phillips, 2007). Researchers also suggest that larger numbers of students wait until they are preparing for an exam to read the assignments (Clump, Bauer, & Bradley; Clump & Doll; Phillips). Method and Materials

The study was conducted using two Midwestern universities. A total of 395 participants were surveyed for the study; 219 of the participants were pursuing their degree in teacher education and 176 of the participants were non-teacher education majors. For the purpose of this study, when addressing teacher-education majors, the study is referring to students who are obtaining a degree in education (such as early childhood, middle childhood, adolescent young adult education, world language education, special education, and business education). This is not referring to teachers who are in training to instruct pre-service or current educators. Of the teacher-education participants, 29 were in graduate school, and 190 were obtaining their undergraduate degree. The 176 non-teacher education majors are all enrolled in undergraduate courses. All of the courses surveyed for the study required students to buy a textbook. Each course also assigned weekly readings from the textbooks.

The instrument used to conduct the study was an 11-question survey adapted from *Textbook Reading in this Course Survey* (The Teaching Professor, 2001) (See Figure 1). Seven of the survey questions address students' current reading habits for assigned class readings. Questions were also asked about the amount of time spent on reading the class assignments and the students anticipated grade in the class. In addition, the study strategies students used when reading were addressed. It was also important to observe the role instructors play in the participants' reading habits. The participants' views on the relationship between the instructors' lectures and their classroom activities with the assigned readings were addressed. It also asked how the professors or instructors could enable students to learn their required reading material more effectively.

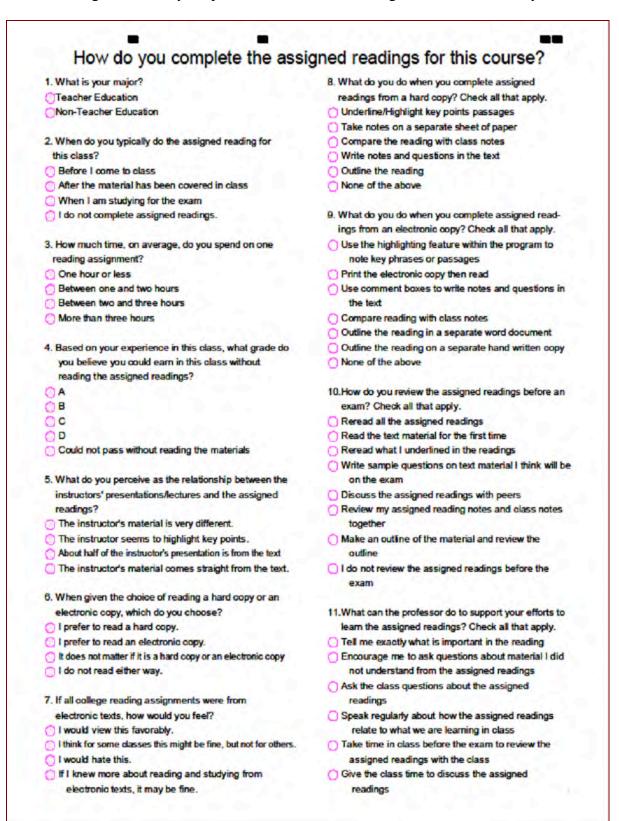


Figure 1. Survey adapted from Textbook Reading in this Course Survey

Results

All tables provide the frequency, and percent for each question. The data were analyzed using univariate descriptive analysis, which allows for each variable to be analyzed independently.

Table 1 identifies the number of hours participants spent on their assigned readings. The results indicate that majority of the students (40%) complete their assigned readings when preparing for exams. Only 24.8% of students indicated they read the assigned materials before coming to class. It should also be noted that 18.7% of the students reported they did not complete the assigned readings for class.

When Readings Are Completed	Frequency	
	Percent	
Before coming to class	98	24.8
After the material has been covered in class	59	14.9
When studying for the exam	161	40.8
Don't complete readings	74	18.7
Total	392	99.2
No Response	3	0.8
Total	395	100.0

Table 1. When Assigned Readings are Typically Completed

Table 2 presents the amount of time, on average, students spent reading one of the assigned readings. According to students surveyed, 62.4% spent one hour or less on their assigned readings while 31.9 % of the students indicated they read between one and two hours. Thus, 93.9% of the students spent less than two hours on assigned class readings.

Table 2. How Much Time (Average) is Spent Reading Assignments

Number of Hours	Frequenc	y
	Percent	
On hour or less	245	62.0
Between one and two hours	126	31.9
Between two and three hours	18	4.6
More than three hours	6	1.5
Total	395	100.0

Another question asked students to indicate what grade they believed they could earn without doing any of the reading. Table 3 shows that 89.1% of the participants believed they could receive a C or better. Interestingly, 31.6% of the students believed they could obtain an A in the class without doing any assigned readings, while 32.2% believed they could receive a B.

Students were asked to identify any strategies they used when completing an assigned reading from a hard copy. The participants were able to select all options that applied. Table 4 shows the results. A total of 36.2 % of students identified underlining/ highlighting key points in the passage to be one of their reading strategies. Another 24.2 % of students selected taking notes on a separate sheet of paper, and 13.8 % of students selected comparing the reading with class notes.

Table 3. Perceptions of Grade Without Reading

Grade	Frequency	Percent
А	125	31.6
В	127	32.2
С	100	25.3
D	32	8.1
Could not pass without reading	11	2.0
Total	395	100.0

Table 4. Reading Strategies From Hard Copy of Text

Strategies	Frequency	Percent
Underline/Highlight key points	233	36.2
Take notes on a separate sheet of paper	156	24.2
Compare the reading with class notes	89	13.8
Write notes and questions in the text	63	9.8
Outline the reading	55	8.5
None of the Above	48	7.5
Total	644	100.0

Table 5 indicates the participants' perception of the relationship between the instructors' presentation/lectures and the assigned readings. The large majority of students (75.2%) identified the instructor as highlighting the key points while 11.1 % of participants stated their perception to be that half of the instructor's presentation was from the text.

Relationship	Frequency	Percent
Instructor's material is very different.	28	7.1
Instructor seems to highlight key points	297	75.2
About half of the instructor's presentation is from the	e text. 44	11.1
Instructor's material comes straight from the text.	23	5.8
Total	392	99.2
Not Reported	3	0.8
Total	395	100.0

 Table 5. Perceived Relationship between Instructor's Presentations/Lectures and Readings

When asked what the professor could do, participants were able to select multiple responses. Table 6 indicates 27.9 % of students stated the professor could tell exactly what is important in the reading. Another 19.6 % of students indicated the professor could speak regularly about how the assigned readings relate to what is currently being taught in class, and 18.5 % selected taking time in class before the exam to review the assigned readings.

Table 6. What Can the Professor Do?

What Can Professor Do?	Frequency	Percent
Tell me what is important in the reading.	265	27.9
Encourage me to ask questions.	74	7.8
Ask the class questions about the readings.	126	13.3
Speak regularly about how the two are related.	186	19.6
Take time in class to review readings before exam.	176	18.5
Give class time to discuss assigned readings	122	12.9
Total	949	100.0

Discussion and Implications

This study explored students' perceptions of assigned class readings. The results of this study may be somewhat discouraging to college faculty. According to the participants, a staggering 62% of students spend an hour or less reading their assigned materials and only 6.1% spend more than two hours reading. Although only 24.8% of participants completed assigned readings before class, 40.8% of the participants indicated they did their reading only when preparing for exams. Approximately 89% of students believed they could receive a C or better without completing any of the assigned readings. It was also discovered that students would prefer (a)

instructors review the assigned class readings, (b) speak regularly about the readings, and (c) discuss the important points from the readings.

Many professors assign readings and expect the students to enter class with a base knowledge of the content being covered in the classroom. However, this may not be the case with many students. Teachers may need to reduce the amount of reading that is required to keep the readings short and functional.

It is also vital for instructors to evaluate their reasons for assigning class readings. If readings are assigned as busy work, the teacher must ask if the readings are necessary. If the purpose of the reading is to be the core focus of the class or is necessary for student understanding, the instructor must convey the importance of the readings to the students (Ryan, 2006). The instructor may do this by having a discussion with the class about the overall role the readings will play in class. This will set clear expectations of how, when, and why students should be reading the assignments. If the instructor does not discuss or acknowledge the assigned readings, students will not see the value of the assignment.

Instructors may also want to develop innovative techniques to ensure that students are reading their assignments on a regular basis. This may eliminate students' habits of only reading the materials before exams. Pop quizzes are often suggested as a motivational tool to encourage students to read (Lei, Bartlett, Gorney, & Herschbach, 2010; Ruscio, 2001). Another commonly suggested technique to increase student reading is awarding extra credit (Clump, Bauer, & Bradley, 2004; Lei, Bartlett, Gorney, & Herschbach, 2010). Several researchers (Ryan, 2006; Yonker & Cummins-Sebree, 2009) also suggest that faculty link assigned readings to future assessments and exams. Ryan found that explicit homework on the assigned readings with extensive teacher feedback drastically improved student participation in the assigned readings.

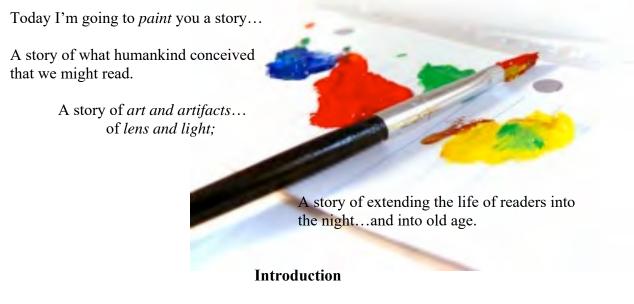
Given the popularity of e-books, Kindles, and Nooks, faculty may wish to pursue electronic versions of textbooks, or engage readers in reading documents online. Online assignments may encourage students to read the information in closer proximity to the class discussion, rather than waiting for test time. Online reading may also be perceived as more relevant and timely. Current, up-to-date information may add an element to class readings that currently does not exist for students.

There is not one solution to the problem of students neglecting to read their assigned class materials; however, it is a growing problem that warrants further investigation. Our results indicated only one-fourth of students read their materials before class, and less than two-thirds of the students spent more than one hour reading the assignments. This, much like previous research (Burchfield & Sappington, 2000; Clump, Bauer, & Bradley, 2004; Clump & Doll, 2007; Phillips & Phillips, 2007), suggests students are increasingly reading less and less. The information gleaned from these research initiatives must be used continue on this further develop strategies to help improve the amount of students engaging in classroom readings. While much can be learned from the results of this study, there is much room for further research.

References

- Burchfield, C. & Sappington, J. (2000). Compliance with required reading assignments. *Teaching of Psychology*, 27, 1, 58-60.
- Clump, M. A., Bauer, H., & Bradley, C. (2004). The extent to which psychology students read textbooks: A multiple class analysis of reading across the psychology curriculum. *Journal of Instructional Psychology*, 31(3), 227-232.
- Beeser, D., Stone, G., & Nan, L. (1999). Textbooks and teaching: A lesson from students. Journalism & Mass Communication Educator, 53 (4), 4-17.
- Clump, M. A. & Doll, J. (2007). Do levels of reading course material continue? An examination in a forensic psychology graduate program. *Journal of Instructional Psychology*, 34(4), 242-246.
- Lei, S. A., Bartlett, K. A., Gorney, S. E., & Herschbach, T. R. (2010). Resistance to reading compliance among college students: Instructor's perspectives. *College Student Journal*, 44(2), 219-230.
- Ryan, T. (2006). Motivating novice students to read their textbooks. *Journal of Instructional Psychology*, 33, 135-140.
- The Teaching Professor. (2001). Students and textbooks: Feedback can improve the relationship. *The Teaching Professor*, 1 (7), 7-8.
- Yonker, E. & Cummins-Sebree, S. (2009). To read or not to read: How student characteristics relate to textbook reading. *AURCO Journal*, 15, 163-172.

Painted Literacy: Lens and Light Celebrating the Tools that Help Us See Text



In a nutshell, I'd like to picture for you through *works of art*, the long line of *tools and technologies* that have defined our literacy history and practices and helped us to see and process text better. The paper is divided into three parts: the contributions of (a) early vision aids and (b) multi-lens spectacles (both of which help focus the words), and (c) illumination tools (that brighten the page).

Theoretical Framework

Before I chronicle the development of these vision aids that have extended our literacy lives, let me first *frame*, so to speak, a short rationale as to why this might be important to consider. For the theoretical background I draw from the work of the Literacy Research Group at Lancaster University (Barton, Hamilton, & Ivanic, 2000) and Christina Haas (1996).

The *socially situated literacy* scholarship of David Barton and his group of researchers (Barton, Hamilton, & Ivanic, 2000) speaks to the significance of studying broad literacy *practices*, literacy *events* that reflect these practices, and specific texts that are part of those events. Thus, "literacy practices are best understood as a set of social practices; these can be inferred from events which are mediated by written text" (p. 8).

Situated literacy practices involve reading and writing with different:

- 1. *Purposes* (communication, information production and retrieval, religious intent, education, aesthetics, recreation, organization, critique, etc.);
- 2. Domains (school, church, workplace, home, library, sports venue, etc.);
- 3. *Habits* (listening vs. speaking, oral vs. silent, individual vs. group; active vs. passive, intensive vs. extensive);

- 4. *Participants* (male/female, religious/secular, rich/poor, literate/illiterate, etc.) as well as;
- 5. Varying *values and beliefs* about literacy.

Christina Haas (1996) argued that the best way to understand these literacy practices is to study their artifacts or what she calls " the *materiality of literacy*." She viewed literacy as language made material and "through writing, the world of tools and artifacts is joined to the symbolic world of language" (p. 3). Thus, the "acts of reading and writing...are inescapably technological" (p. 205).

Supporting the importance of materiality, Baron (1999) maintained that writing (viz., the alphabet) was the first technology of literacy and that "the computer is simply the latest step in a long line of writing technologies" (p. 17). We often lose sight of the small incremental developments made in writing technologies. They are so subtle that they become culturally transparent and natural to us, we do not see them as *technological* (Baron, 1999; Haas, 1996).

New literacy technologies begin in a restricted community with only a small number of participants. Often involving a high cost and status/elitist power structure, users keep the technology to themselves, but over time gradually extend it to the larger general community. Consequently, cost decreases and the technology become familiar, spreads across populations and becomes a natural form of communication (Baron, 1999; Haas, 1996). Witness the development and dissemination of computers from the elite to the masses over the last 30 years—recently, the E-book and smart phone phenomena.

As each new literacy form and surface (from clay tablets to electronic tablets) evolved, a plethora of supporting technologies and materials developed: writing tools and accessories designed to accompany each form, furniture specifically built for different reading/writing activities, preservation devices crafted for storage and protection, and lights and vision aids invented to improve ability to see text. Together, these technologies and artifacts are indelibly tied to literacy practices and how people go about the business of reading and writing in daily life, driving our historical practices and ultimately, shaping innovative practices to come.

Essentially, "to understand contemporary literacy it is necessary to document the ways in which *literacy is historically situated*; literacy practices are as fluid, dynamic and changing as the lives and societies of which they are a part" ((Barton, Hamilton, & Ivanic, 2000, p. 13). However, "...change and time in literacy practices can often be overlooked because both are particularly difficult to document" (Tusting, Ivanic & Wilson, 2000, p. 217). Thus, historical written and associated archaeological evidence are critical in helping us *situate* or create the past. *Art representations*, in particular, provide vivid and lush images of reading and writing activities and artifacts in action over centuries and across cultures; the context giving meaning to literate behaviors in each unique snapshot of time, place, and people.

The Gift of Art to Literacy

In truth, artists, quite unintentionally and serendipitously, have given the world a huge gift. They have put literacy practices, at the heart of thousands of paintings from ancient to contemporary times, literally come to life. For reading educators, historians and art aficionados these artistic works of people reading and writing through the ages are:

- 1. A proverbial feast for the eyes,
- 2. A critical source of what we know about how people learned to become literate,
- 3. A *powerful provenance* of the changing nature over time of both public and private literacy practices, and
- 4. A detailed *visual record* of the long line of literacy technologies and associated artifacts—the stuff of literacy.

The Stuff of Literacy

Indeed, the *stuff of literacy* entails hundreds of artifacts. As I researched the amazing array of these, I found the examples fell into six categories as shown in Figures 1-6. Because of the extensive nature of literacy artifacts, I will explore in this paper only the latter two categories, viz., *Vision Aids* and *Illumination*, and how these tools of lens and light have better-improved mankind's ability to see text—through the eyes of artists.



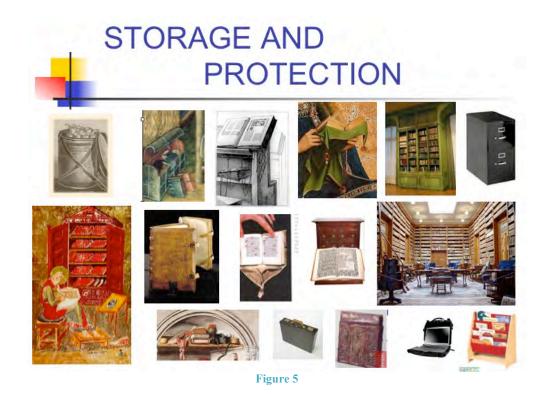
WRITING TOOLS AND ACCESSORIES



Figure 3



Figure 4







Earliest Vision Aids Part I

From the inception of writing some 4000 years ago in the 19th century BCE, the process of reading and writing had to be difficult, particularly as literates aged (Side Bar 1). Supposedly lacking tools to enhance their vision, Cicero (106-43 BCE) and several other Roman authors wrote complaining about their weakening eyesight and how they had to be read to by literate slaves, as they grew older.

However, fresh analysis of both new and old documents and archeological evidence in the last few decades suggests that the ancients—*whether with normal or poor eyesight*— did use various means to improve their vision of text. We know that some sort of magnification had to exist because of the numerous examples of microscopic writing and carving from antiquity that still exist today or were documented in early writings (Enoch, 2007; Ilardi, 2007; Rosenthal, 1996; Temple, 2000; Willach, 2008). Let me give you three examples:

The world's first readers and writers living in the Mesopotamia region were scribes who were accountants and secretaries. They worked with excruciatingly tiny cuneiforms on small clay tablets that they cradled in their hands (Fischer, 2003). (Picture our current smart phones or PDAs!). Writing was so tiny (micro) that the text would have been impossible to read by the naked eye. Figure 7 shows one such tablet an issuing of barley ration (c. 2350 BCE).

In another instance, archeologists working at the Dead Sea Scroll excavation in Qumran unearthed several tefillins (phylacteries) from the 1st century CE with Hebrew so minute

that (except for a severely myopic condition) only a magnification of the writing makes it legible (Enoch, 1998). (See Figure 8.)

In the same century, Pliny, the Elder in his *Natural History* (77 CE) noted that Cicero (in a lost manuscript dated 1 BCE) wrote of a parchment copy of Homer's poem *The Iliad*

Struggling to See Text: 3 Major Vision Problems

- **Hyperopia (farsightedness)**
 - Inability to see close writing clearly
 - Type of refractive error as light hits the retina
 - Problem exacerbated at night when eyes are tired or light is dim
 - Corrected with convex lenses or improved light
 - Improves with better light
- Myopia (nearsightedness)
 - Inability to see text far away clearly
 - Type of refractive error as light hits the retina
 - Problem exacerbated at night when eyes are tired or light is dim
 - Corrected with concave lenses and better light
- Presbyopia (meaning 'the eyes of the old' in Greek)
 - Slow loss of the ability to actively focus on close text
 - Generally due to normal aging; lens become less flexible and loses elasticity
 - Corrected with non-prescription reading glasses that magnify letters and by increasing the available light.
 - May well have been the impetus for single and double lens vision aids development in the 1200s.

Side Bar 1

Water Globes

Our first hint is textual: Seneca, the Younger (c. 4-65 CE) the Roman Philosopher wrote of the magnification of text by use of water globes, i.e., an enhanced water-based reading tool. In his book *Natural Questions* he said, "Letters, however small and obscure, are seen larger and clearer through a glass ball filled with water...." (as cited in Ilardi, 2007, p. 42). Allegedly, Seneca boasted that he read "all the books of Rome" by viewing the pages through the water.

that was written in micro-script enclosed in a nutshell (Temple, 2000). The famous phrase "in a nutshell" survives today.

Figure 7. Cuneiform clay tablet



Figure 8. Qumran microscopic phylactery



The big question is what did early writers and readers use?

Somewhat later, Christian Father Clement of Alexander (2nd Century CE) wrote about enlarged "images seen through the water, and things seen through pellucid [clear] and transparent bodies" (as cited in Temple, 2000, p. 78).

In his book The Chrystal Sun, Robert Temple (2000), demonstrated the magnification

power of a tiny Roman glass globe from the Bonn Museum. When he filled the ball with water and held it over text, the letters appeared much larger (Figure 9).

Many scholars believe these tiny pocket-sized balls along with the sun, served as burning-globes for cauterizing wounds and starting fires. Temple (2000) suggests that hundreds of these Roman mass-produced items owned by museums actually have been mislabeled as make-up globes (also called toilet globes) used for holding of perfumes and other items for women.

Funde und

im Be. Archäologische B

Figure 9. Roman water globe

Mirrors

Seneca, the Younger also alluded to the use of mirrors as vision enhancing tool for reading and close work (Ilardi, 2007). As an artifact, mirrors are actually far older than glass spheres.

Figure 10 is a photograph of the oldest extant mirror. Found in south-central Turkey and manufactured 8,000 years ago (Enoch, 2006, 2007, 2009) from obsidian (a type of dark igneous volcanic glass), the mirror shows an image

of the woman holding the mirror. Some mirrors were slightly concave and clearly could have been used for magnification.

Although there is little written evidence attesting to mirrors as vision aids, scholars believe they "played a lengthy and important role in early vision corrections as magnifiers" (Enoch, 2006, p. 775) for an extended period before we had spectacles— enlarging and enhancing faded lettering. Pliny, the Elder, the Roman historian speaks of mirrors held perpendicular to improve images in the 1st century CE (Rosenthal, 1996). Around 1280 CE, Heinrich Frauenlob (1250/1260-1318), Middle High German poet, wrote a poem describing how writing can be made readable for an old person with the use of (presumably concave) mirrors (Rosenthal, 1996) and about the same time French author Jean de Meun (c. 1250-1305) discussed "the marvelous powers that all things that are very small—thin letters, very narrow writing...are seen as so great and large and are put so close to the observers...that one can read them...." (as cited in Ilardi, 2007, p. 44).

While mirrors (like water globes) were commonly used as combustion and cauterizing agents, they also were part of a unique literacy practice—that of capturing the reflection of the sun to melt the wax of tablets (Figure 11). This, in effect, erased the text on the



Figure 10. Oldest surviving

mirror

Figure 11. Roman waxed tablet



wax surface; once hardened, the blank surface could be reused for writing, much like the modern eraser or computer delete key does today.

Classical and medieval images in art, suggest that mirrors with concave shaped surfaces were made usually out of metal and then subsequently, glass. Some look amazingly similar to our hand-mirrors (Figure 12) and stemmed magnifying

Figure 12. Modern hand mirror



mirrors of today (Figure 13).

The major challenge of using a mirror to enlarge text is that the image is reversed. Two adaptive reading practices evolved over centuries to solve the problem.

Figure 13. Modern magnifier mirror



First was the cultivation of the skill of reading and writing in reverse images. Indeed, medieval reader/writers as well as early printers and engravers were quite adept at working with mirror images and did so routinely. For instance, we know Leonardo da Vinci wrote in Italian in reverse (right to left) and his writings are quite "legible by the aid of a mirror" (Frugoni, 2003, p. 7).

Another practice was the use of a second mirror to right the enlarged image of script. In 1589, Giambattista della Porta in his *Magia Natural* described the 2-mirror process of reading:

To my surprise and delight, my experiment with a makeup mirror and a hand mirror (Figures 12 and 13) allowed me to enlarge almost a whole page at a time so as to be quite readable. However, this technique could only be used for reading because with my hands full, writing was out of the question.

As to painted depiction of mirrors, we have a few ancient examples pictured on Greeks vases and in Roman frescos. Generally, the images were of various Gods (Aphrodite, Laso and Eros) whose attributes or symbols were mirrors, as in Figure 14. While there is a smattering of depictions of mirrors in illuminated manuscripts between 1185-1350, no paintings associated mirrors with real-life literacy practices until a groundbreaking Italian fresco (Figure 15) in 1352 was painted by Tommaso da Modena (c. 1325-1379) (also spelled Tomaso). Figure 14. *Aphrodite* with hand mirror



On the north wall in the Chapter House of the San Nicolo Monastery at Treviso, Italy (Figure 16), Tommaso depicted a concave mirror flanked with writing equipment, implying the tool's reflective ability to ease the eyes and magnify the letters. On a shelf above the tonsured miracle-worker St. Pietro Isnardo of Chiampo (or Vicenza) (c. 1200-1244), stands a concave reading mirror mounted on a metal stand accompanied by a pen

and inkpot on a little ledge below. The mirror looks surprising like our modern makeup mirrors.

In all, Tommaso pictured 40 real-life Dominican dignitaries seated in their tiny cells either studying or composing. The cells formed a single row ringing four walls below the wooden ceiling of the Monastery Chapter House. The illustrious figures dressed in similar dark brown cloaks over white habits are seated at large yellow desks surrounded by writing/reading materials, engaged—but isolated from each other—in some scholarly pursuit. As you will

Figure 15. San Nicolo Chapter House with Tommaso fresco Order



see

from other of these wall portraits to be described further on, it is hard not to characterize this wonderful fresco as the most seminal artistic representation in the history of optics and literacy!



Figure 16. *Saint Isnardo* and detail of a medieval magnifying mirror



Gibbs (1989) posits that Isnardo's "reading glass" despite its bothersome habit of reversing text was used regularly as an important tool in the Middle Ages and Renaissance for enlarging small and faded handwriting. Early Renaissance manuscript

illuminations of other noted authors in scriptorium scenes give credence to this idea. For example, in an author portrait of the late 1400s (Figure 17), Dominican author Vincent of Beauvais (c. 1190-1264?) is shown composing his book in a frontispiece of *Speculum*

Historiale in his study. A concave mirror stands prominently behind his slanted writing desk, suggesting (like Isnardo) that Vincent depended on the vision aid to magnify and reduce eyestrain as he wrote.¹ (Take note of

Figure 17. Detail of Beauvais composing and of the enlarging mirror





the many other literacy artifacts, including bookshelves with highly decorated manuscript covers, scroll, page weights, and pen.)

Shortly after Isnardo's portrait, Tommaso (1352) painted another fresco on a column in the left nave of the attached Treviso Church of San Nicolo. Included in St. Jerome's writing paraphernalia was a unique type of mirror for magnification of letters—one not ever seen today (Figure 18 and detail).

Figure 18. Jerome in His Study with horned shaped mirror detail



Above the book to the right is a small reading mirror in a horned-shaped leather case probably filled with sand for balance. Ilardi (2008) said the mirror seems placed "at the right angle for focusing and enlarging letters" (p. 276) and argued that this is possibly the first

depiction in Western painting of a horn-shaped reading mirror.

Some 100 years later, in a remarkable painting of Jerome (1445) amid his scholarly clutter, a much larger horned-shaped mirror (Figure 19 and detail) sits in the corner of his desk.





Figure 19. *Jerome in His Study* and detail of horned shaped mirror



Jerome's horn-shaped mirror is very similar to one pictured in a woodcut picturing standard calligraphy equipment for writers and scribes in the 1500s (Figure 20 and detail).

In his book *Libro nuovo d'imparare a scrivere* ("A New Book for Learning to Write") originally published in 1540, Giovanni Battista Palatino (c.1515-c.1575) extoled the virtues of mirrors. After discussing various tools of a scrivener including a compass, square, ruler, scissors, string, seal, he declared "the mirror is used to save the sight and to assist it in continuous steady writing. It is much better of glass than of steel." (as cited in

Frugoni, 2003, p. 7; Ilardi, 2007, p. 45). Noteworthy to this discussion on early vision enhancement, Palatino even included a chapter on mirror-writing (Mellby, 2008).

Reading Stones

As the beryl enlarges writing to read in it..., It grows high, broad, wide and also long. Albrecht von Scharfenberg (1270) (as cited in Andressen, 1998, p. 12)

It (i.e. the crystal) has in it such great powers That be writing ever so small, It looks larger in it; If this stone thought about it and encroached If someone ground it thin and wanted to hold it on the writing, he would see through it the little letters look bigger. Konrad of Wurzburg (1270) (as cited in Andressen, 1998, p. 12) Figure 20. Standard calligraphy equipment and detail of horn mirror (1540)



Prior to water globes and mirrors, many experts argue that the first reading aids used by the ancients to improve sight were actually clear natural pebbles, referred to as *reading stones*. Also called, *magnifying stones*, these transparent rocks made from rock crystal, quartz or beryl, were our first simple magnifiers. Generally flat on one side and strongly convex on the other (called plano-convex), they were laid flat-side down directly onto the letters to enlarge them, as in this example owned by the Zeiss Optical Museum in Oberkochen, Germany (Figure 21).

Figure 21. Reading Stone



Literacy sources describing the use of stone readers are scarce. The oldest extant reference was by Aristophanes, a Greek playwright and a contemporary of Plato and Socrates in 427 BCE who mentioned the use of a fine transparent stone with which fires are kindled and writing is melted away on wax tablets (Rosenthal, 1996, p. 389). Alhazen (956-1039) gave a description of "spherical glass segment used to correct defective

Figure 22. Modern dome magno-illuminator



vision" (Daxecker, 1997, p. 177). The next written references were in the mid-13th century in the two German poems (see above).

However, there is widespread archeological evidence as far back as the Bronze Age of hundreds of highly polished plano-convex lens suitable for reading and other close work—from ancient Egypt, to Troy, Crete, Assyria, Germany and Scandinavia. Often these objects have been or are hidden away in museums, never analyzed for optical properties and mistakenly labeled as jewelry or decorative objects (Enoch, 2007; Ilardi, 2007; Rosenthal, 1996; Temple, 2000; Willach, 2008).

A direct descendant of the reading stone is the modern paperweight or dome magnifier that both magnifies and gathers in light for crisper, brighter reading. Contemporary readers use this *magno-illuminator* in the same way as the early reading stone (i.e. placing it directly over the text); however, instead of a rock crystal, quartz or beryl, the dome is made of glass or acrylic. Figure 22 is one such example.

Temple (2000) identifies one of the Sloane lens in the Natural History Museum, London, as a remarkable example of an ancient reading stone that is a magno-illuminator. Made of rock crystal, the lens has a domed top that is completely transparent. In a dim room the illumination is doubled on the portion of the text one is reading simply by placing the lens upon the print and; the print is enlarged 2 ! to 3 times as shown in Figure 23.

Figure 23. Sloane Lens at British Museum



A rare depiction of reading stones was painted by Ludwig Konraiter at Innsbruck, Austria in a gothic altarpiece showing scenes of the life of St. Mary and St. Ursula (1485–1490) (Figure 24 and detail). On the far right among 10 women saints, Saint Ottilia (1485-1490) is looking down at two reading stones resting on an open book. Konraiter cleverly depicted how the two reading stones placed on each page of the book magnify the words underneath. This may well be the oldest painting of a woman reading with any optical device.

Figure 24. Scene in the Life of St. Mary and Ursula and detail of St. Ottilia with two reading stones on a book.





Figure 25. Saints Christina and Ottilia detail with eyeballs



Saint Ottilia (Odilia) of Alsace (660-c. 720 CE) was an Abbess who was born blind and miraculously regained her vision when baptized as an infant. Consequently, the Catholic Church named her the patron saint of sufferers of eye disease—celebrating her on December 13th. Most representations of Ottilia show her holding a book with actual eyeballs as in this 1506 painting by Cranch at the National Gallery in London (Figure 25). As a well educated and learned Benedictine nun, her attribute is a book with eyeballs to signify her restored sight.

Single Lens Reading Glasses

Pragmatically, stone readers were not very ideal for writing because they had to be placed on the text to enlarge it; and for the most part, were so strong (often 10-40 diopters) that they were of limited help to those suffering from poor vision (i.e., presbyopia, hyperopia and myopia).

However, from the ancient world, we have archeological evidence that man

Dioptric Correction vs. Magnification

A diopter (D) is a metric measure of the refractive power of a lens. People with myopia use concave lens with negative diopter values (generally -1.25 to -3.00 D), while those with hyperopia use convex lens with positive values (+1.25 to +3.0 D) to correct refractive errors and make letters more readable.

On the other hand, a good magnifying lens works on a different optical principle, being only convex and much stronger, generally with a diopter measure of +10 or more. Magnifiers bend the light to make things *appear* closer and larger. For the most part, reading stones were in the range of +10 to +40 D.

A *dioptrical corrective lens* (Willach, 2008) functions like spectacles and is held close to the eye to correct the wrong focal length of the eye lens, while magnifying lens held closer to the text just enlarges the actual dimensions of the text. Allowing for artistic license, the position of the lens to the eye relative to the text in art images allow educated guesses as to what type of vision aid the tool might be.

Side Bar 2

discovered how to improve the optical quality of these crude powerful quartz stones by making them thinner, weaker and slightly convex, suitable for magnification or dioptrical correction (see Side Bar 2). Willach hypothesized (2008) that through the Middle Ages, the ancient art of stone grinding and polishing technology continued to be refined but, for the most part, only in monastery workshops.

These thinly honed rock-crystals (and later glass) discs became seen as precious objects and used for secular and religious ornamentation. As early as the 8th century CE, lenslike transparent objects were used to decorate liturgical art objects (like crosses, manuscript book covers, etc.) and for protective coverings of sacred relics of various saints or martyrs (i.e., holy cross splinters, bones, etc. from the crusades) in what were called *plate-reliquaries*. Figure 26 shows one such example, a wooden German Table Reliquary (1220-1225) with 12 windows displaying various relics and their labels. Making a replica of the slightly convex rock-crystal disc of window #4 (Figure 26 detail), Willach (2008, pp. 21-25) effectively demonstrated that with this lens, text was quite clear and readable for a presbyopic eye of +4.2 diopter at a distance of 25 cm.





Figure 26. Table reliquary and detail of window # 4 Likely discovering that these clear, thin discs could improve sight during the grinding, polishing and finishing process of ornamentation or reliquary windows, chances are that some inventive monk shaped a wooden frame and handle for the lens to be held in front of the eye for ease of reading and writing in the scriptoriums—effectively extending the literacy life of monastery scholars, manuscript illuminators, scribes and copyists. Presto! We had our first single lens corrective reading aid. Amazingly, this stemmed monocular has gone in and out of fashion, but not out of use for the last 750 years!

The earliest known depiction of a single dioptrical vision aid (c. 1260) is on a sculpture of painted sandstone at the St. Maurice's Rotunda in Konstanz (Constance), Germany (Figure 27) (World Lingo, 2010). On the interior of the 12 sided *Holy Sepulcher* representing the sacred grave of Christ, is a scene of three women buying ointment for embalming Jesus from a pharmacist who holds in his left hand a lens with a stem (Figure 28). The lens is only slightly curved and not highly convex, suggesting it is not a reading stone, but instead a reading lens held to the eye to correct the vision of the farsighted and aged.² Some scholars believe this figure may be the Greek Hippocrates, the famous physician of Antiquity, pictured with his reading glass as "a symbol of wisdom and age" (Willach, 2008, p. 25).

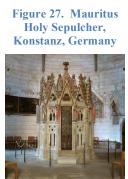




Figure 28. Pharmacist holding single dioptrical lens (c. 1260)

In the very same amazing Treviso fresco that included a representation of a magnifying mirror (Figure 16) by Tommaso da Modena in 1352, we find the *earliest extant painting of a single reading lens* on the southern wall. Aging Cardinal Nicholas of Rouen (Figure 29) holds a stemmed lens made of rock-crystal close to his eye as he strains to see the page of a book. The position of the lens suggests that it is a corrective tool, not a magnifier.

Figure 29. Portrait of Nicholas of Rouen and detail of a monocular reading lens



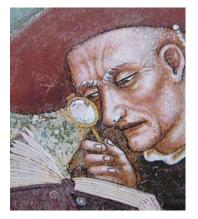


Figure 30. Philosopher with single lens



The second oldest painting (Figure 30) of a single lens reading aid is another fresco by Andrea dei Bartoli (c. 1349-1369) a contemporary of Tommaso, in Cardinal Albornoz's Burial Chapel at Assisi (1367-69). In the lower left of a larger scene depicting St. Catherine debating the philosophers, two learned men consult an open book, one with a stemmed corrective lens (like Rouen) held close to his eye for either presbyopia or hyperopia issues.

Literates with myopia, on the other hand, had to wait almost 150 years before their sight could be improved with a concave lens. Nicholas of Cusa (1401-1464) a German theologian, philosopher

and scientist was the first to use concave lenses to correct nearsightedness in 1451. In one of his greatest masterpieces, Raphael (1483-1520) painted the first known portrait of

a person using a single bi-

concave lens to compensate for myopia in 1518.

Figure 31 depicts Pope Leo X of Medici Family (1475-1521) known for severe myopia (-12 diopters) holding an elegant stemmed bi-concave lens as he studies an illuminated

Myopia Mystique

While in the West, myopia is only connected to a relatively small portion of our population (20-25 % of adults with eye problems (Hyman, 2007), it seems to affect a very high percentage of creative people.

Many of our greatest poets and writers were nearsighted including Milton, Goethe, Keats, James Joyce and Edward Lear. Famous myopic musicians included Bach, Beethoven, Schubert and Wagner. Intriguingly, a number of our most revered painters were believed to be shortsighted: Blake, Degas, Cezanne and possibly Van Eyck, Durer, and Vermeer. (Macfarlane & Martin, 2002; Marmor & Ravin, 2009)

Side Bar 3

Figure 31. Myopic Pope and detail of his concave single reading lens





the

manuscript. Flanking, but not interacting with the Holy Father are two of his cousins, Cardinals Luigi de' Rossi and Giulio de Medici. The famous portrait is rich in details, including a bell (symbolizing power) and the 14th century

"*Hamilton Bible* (now at Berlin Staatliche Museum) open to the first verse of the Gospel of John: 'In the beginning there was the word'"(Beyer, 2003, p. 146). (See Sidebar 3 for more information on myopia.)

Later, Jacope da Empoli (1551-1641) captured the very same Pope in the act of actually reading with his single concave *lens* (*Figure 32*). As Michelangelo presents his model of San Figure 32. Pope Leo reading with his concave lens



Lorenzo, the Pope holds the handled single concave lens in his right hand closer to his eye as he digests the distant material lying on the table (1617). (See *Side Bar* 3 for more information on Myopia.)

Quizzers

Although still with a handle, a distinctly different form of single lens achieved great popularity in the 1700s to mid-1800s. Called a *Quizzing Glass* or the more common

name, *Quizzer*, this aid was particularly in vogue in Western Europe with both genders (Corson, 1967; Rosenthal, 1996). The name came from the practice of holding the glass "up to the eye "to 'quiz' (stare, glance, look at quizzically) people and objects. The wearer would sometimes glare at a person through his or her quizzing glass as a manner of set-down or mockery..." (Hern, 2004).

18

Figure 33. Examples of

quizzers

Quizzing glasses had long or short handles and were different from the monocular seen so far in that they were smaller, had loops at the end of the handle, and glass set in a thinner metal frame, although the earliest ones were made of wood. The glass was first in the form of plain small round lens but later

manufactured in oval, oblong and square shapes. The loops were for holding by hand or attaching a chord to suspend the glass around the neck. (Figure 33)

Figure 34. A quizzer caricature by I. R. and G. Cruikshank (1830)



Quizzing glasses were primarily a grand public fashion statement! Often highly ornamented, both women and men used them as jewelry or accessories. Foppish young men brandished them for effect, loving to posture, gesture and even caressing the quizzers—great fodder for caricatures of that time (Figure 34). The effect of closing one eye as one looked through the lens held close to the socket gave an air of snobbishness or hubris.

However, quizzing glasses also were taken seriously as an aid to reading. Most single lenses were convex simple magnifiers, although some were set with corrective lens (for hyperopia and presbyopia) for those who did not like to be seen with spectacles outside the home (Corson, 1967; Hern, 2004; Rosenthal, 1996). By their nature (i.e., hand-held), quizzing glasses were best adapted for *casual reading* as opposed to serious *extended reading;* however, some paintings suggest that wearers did read with them for protracted periods of times. The practice of wearing quizzers as a pendant around the neck allowed for handy access while reading or doing close work—a forerunner of the contemporary habit of hanging reading glasses on chains or chords. Some quizzers even had handles with swivel-mounts so that they could hang flat against the body when not in use.

That the quizzer was often the preferred vision aid is indicated by portraits of writers, artists and prominent men of the time sporting the little stemmed glass disks. Paintings

attest to the role quizzers played as serious literary artifacts and also of their popularity or status among the educated or artistic communities.

For instance, French painter Theodore Rousseau (1812-1867) evidently must have considered a quizzing glass draped like a watch across his stomach (1850) a suitable

Figure 35. Theodore Rousseau



statement concerning his choice of a vision aid (Figure *35*). Olinthus Gilbert Gregory (1774-1841) (English mathematician, teacher, author and editor) was painted in 1835 *Figure 36*) with a quizzing glass, hanging prominently against his vest above the closed book in his left hand—leaving little doubt that the visual aid was an

important part in maintaining his scholarship in his advancing age of 61.

Figure 36. *Olinthus Gilbert Gregory* with quizzer

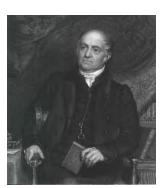


Figure 37. A literate lady!



The women were not left out of the quizzing picture, so to speak, with several painted caricatures as well as portraits featuring the single lens in hand. Although meant as a fashion statement "A Lady in a Levantine Hat" (1797) actually seems to poke fun at both the quizzer and the woman as a reader (Figure 37). Elegantly poised in her puffy hat with an open book in one hand and the little lens in the other, this young lady is strutting!

The most stunning and elegant painting I have found of a quizzing glass is a portrait of Madame Marcotte de Sainte-Marie (1826), a family friend of the painter Ingres (Figure 38). "Dressed to the nines" in brown satin and resting on a gold

couch, Mrs. Marcotte has a very fancy chain around her neck attached to a lens that she delicately holds as she looks up from her reading.



Figure 38. Madame Marcotte de Sainte-Marie and detail of her quizzing glass



The Geography Lesson (before 1785) by Longhi is a particularly intriguing painting because of the different

Figure 39. *Geography Lesson*



interpretati ons of the use of the quizzers that it garners (*Figure* 39). Is the instructor holding up the lens to stare or look quizzically

at his young female student; is he actually showing his disapproval or

Single Lens Challenges

The single lens could not have been that easy to use in sustained and concentrated reading and writing. The challenges were many-fold:

- The hand holding the lens got tired and shook,
- Print wavered and jumped around,
- One eye had to be closed for better focus (a difficult feat for some people),
- Number of words taken in by the eye was limited and eyestrain common; and
- With one hand occupied, holding a page securely while writing or cradling a book while turning pages at the same time was difficult.

Side Bar 4

setting her down for a wrong answer (another common use of the lens in public); or, is he more interested in the beautiful student than deemed appropriate?

Monocles

Reading and writing with a stemmed monocular for any length of time was demanding (see Sidebar 4). In the 18th century, several new technologies ingeniously solved the challenges of holding a single lens to do close work. The evolution of the relatively rare *head monocles* and the wildly popular *eye rings* (the modern monocle) were a boon to literates in stabilizing the reading lens and freeing both hands.

One such contraption circling the forehead held a single lens suspended over one eye as in Figure 40.



Figure 41. Therbusch's Spina-Frontalis monocle



A woman artist (and an avid reader as well) became infamous for picturing herself wearing a leather or metal strap variation that wrapped over her head and secured under a headdress (Figure 41). Several self-portraits (including Figures 41-42) of Anna Dorethea Therbusch (1721-1783) shows the painter with an open book, as she looks up from

reading-the large convex lens called a *spina-frontalis-monocle* hanging over her right

Figure 42. Anna Therbusch reading with her head monocle



eye. Ilardi (2007) pointed out that "a myope using this contraption with a negative lens could have used the monocle for distance and the unaided eye for close work" (p. 299).

Therbusch (1721-1782) was an accomplished German painter of Polish decent and among other appointments, served as court painter to the court of the Empress of Russia and to King Frederick II of Prussia. In all likelihood Therbusch (55 years old at the time) was suffering from presbyopia and used the lens for painting as well as reading and her other eye for distance. Her vision enhancement is analogues to today's *monovision* technique of one contact lens for near vision on one eye and, if needed, a lens for distance vision on the other eye.

First called an *Eye Ring*, by far the most popular uniocular vision instrument to develop was the *monocle* thought to have evolved from quizzers (Davidson & MacGregor, 2002). Basically the quizzing glass stem was shortened to a simple loop of metal around a circular lens. By considerably reducing the weight, the practiced user could grip the lens "by squeezing the orbicularis muscle" (Holtmann, 1980, p. xv).

The original modern monocle surfaced around 1720s, when German Baron Philip Von Stosch (1691-1757) first introduced the single lens with a string, primarily "for near vision (like reading) and to balance the weaker eye with the good one" (Holtmann, 1980, p. xv). However, the golden era of monocle use (as well as artist's rendering of them) did not occur until the 1880s through the early 1900s. Monocles were commonly used as status symbols and fashion statements by privileged males (Fleishman, 2011).

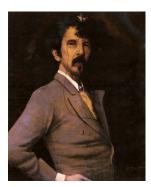
Often made fun of and derided for their foolishness and possible detrimental effect to one's vision, monocles were usually round, but were manufactured in a profusion of other shapes (rectangle, oval, square) with various metals for the frames. Square monocles held in the eye may have been even more fashionable in Paris in mid 1800s than round ones (see Corson, 1967, p. 118-119), as seen in this 1857 caricature (Figure 43) by Claude Monet (1840-1926).



When they were not mere window glass for fashion effect, the aid functioned as an effective dioptrical lens. The wearer may have carried two monocles, one for distance and the other for reading (Rosenthal, 1996). Advances in optometry allowed better measurement of refractive error in the early 1900s so that monocles could actually be

prescribed individually with different strengths—thus becoming a better corrective device.

Figure 44. Whistler's monocle



Paintings of monocle wearers underscore their popularity, particularly in England and Germany, both a hotbed of foppish and serious wearers. Well known artists, politicians, and poets of

the time (as in Figures 44-47) were often seen be-monocled.

The corrective aid worn by the English painter James McNeill Whistler (1834-1903) is a prominent feature of several portraits done of (Figure 44). The glass is as much a of Whistler as his handlebar

mustache. Like Anna Therbusch, as a consummate user of monocles, he probably donned the lens for close painting as as reading. This is a man with attitude!

Figure 45. Chamberlain in his study



him part

well

The numerous paintings of English politician Joseph

Chamberlain (1836-1914) with monocle and surrounded by books and papers made a clear testimony about his intellectual life and preference for reading aids. Figure 45 is one such portrait by Sargent done in 1896.

Like some of our greatest poets, Tennyson (1809-1892) was myopic as confirmed in an early pencil drawing by his friend James Spedding (1808-1881) when they were together at Cambridge in 1831 (Figure 46). Sir Alfred Lord Tennyson, Poet Laureate, is the second most frequently quoted writer in *The Oxford Dictionary of Quotations* after Shakespeare. While no painted portraits exist showing Tennyson with a vision aid, several photographs indicate that he was a serious user of the modern monocle—probably to correct his near-sightedness (Figure 47).

Figure 46. Myopic Tennyson at Cambridge



Figure 47. Tennyson reading with a monocle



As for a German example, Karl Marx (1818-1883) could not be more appropriate. In numerous photographs, prints, and paintings, his monocle is ubiquitous hanging prominently against his chest. Bbasically tainted with their German association, monocles fell into disrepute, particularly after WWI and WWII. Paintings that depicted the monocle as a symbol of German authority, contempt for humankind and domination associated with the Nazi war machine are seen in Figures 49 and 50.





Figure 49. WWI German monocle



Figure 50. WWII German monocle



The Mighty Magnifier

In one of the "earliest of Edgar Degas's (1834-1917) many café scenes, two men are seated at a table, examining what appears to be a newspaper; the man on the right holds a magnifying glass half way between his eye and the paper and his companion wears a monocle. *Café Charteaudun* (1869) leads us to conclude that monocles and simple magnifying glasses were still in fashion and used concurrently for reading by well- off, over-40 males at the mid-to-late 19th century France (Figure 51).

Interestingly, of all the monocular vision aids, the most enduring (spanning the centuries from antiquity to contemporary times) has been the *mighty magnifier*.³ Of course, the oldest vision aids were the first simple magnifiers, reading stones. Their descendants, the "utilitarian (magnifying) reading glasses with handles have been used with astonishingly little change since the 13th century" (Corson, 1967, p. 81).⁴ Two variations of the simple magnifiers are worth noting because of their appearance in paintings and their practical use in enlarging text, even today.

Pocket Magnifiers. Since straight handled magnifiers were too unwieldy to be portable, one

Figure 51. At the Café Châteaudun



transformation since the 13th century was the development of small round compact *pocket magnifier*. By the 1600s, small magnifiers were treated as valuable items, so much so they had cases to keep them safe and unscratched. By the end of the 18th century, the lenses were made to rotate in and out of attached protective cases (Davidson & MacGregor, 2002), making this compact mobile aid quite handy and gave ready access to

magnification needs. Today the folding pocket magnifiers are still very much in demand coming in similar shapes and sizes, some even with illumination.



Figure 52. The Abbot Thomas Valperga with his pocket magnifier and case



In Figure 52 and detail, see how the "simple magnifier (obviously meant for reading) rotates into a decorative metal case that is likely to be silver" (Fleischman, 2011). This 1802 elegant portrait is of Abbot Thomas Valperga of Caluso (1737-1815) by Francois Fabre (1766-1837).

Six Inch Reading Glass. At the other end of the spectrum, perhaps the mother of all personal monocular magnifying aids was the *Reading Glass*. Also referred to as a *gallery* or a *library glass*, the distinct optical form was popular during the 1700s to late 1800s and like the pocket magnifier, is still used today. While smaller, earlier magnifiers had shorter focal lengths, the reading glass was a convex lens of a large diameter (usually about 6 inches), a long focal length of more than ten inches and modest power, designed to be held a few inches from the text. Importantly, these reading glasses allowed use of not one but *both* of the reader's eyes to see the words, essentially solving a problem of much smaller magnifiers.

In this still life painting detail (Figure 53), Charles Spencelayh (1865-1958) captures the essence of the

Figure 54. *Close Scrutiny* by R, Klausner



reading glass as it rests on an open tome ready to be put to work in deciphering the mysteries of the book. Suggestive of what it means to be a consummate reader, the work is entitled *Fingerprints*. The end of the 19th century brought wonderful examples of



narrative paintings with the reading glass in use, particularly by aging male scholars. This gray-haired cardinal surrounded by his scattered books and scholarly accruements, leans intently over a document with his large reading glass in this work (Figure 54) entitled *Close Scrutiny* by R. Klausner.

Figure 53. Fingerprints

As with monocles and magnifiers (see Figure 51), other paintings of the late 1800s showed readers preferring several different viewing options when print clearly presented a challenge. Van Gogh's doctor, Paul Gachet (1829-1909) is pictured in Figure 55 with a large reading glass beside a book upon which rests some dark rimmed spectacles. The artifacts in the portrait conjure up a picture of a learned, aged, educated man with poor eyesight who seriously loved to read, even the fine print!

Figure 56. *Book of Romance* by Norman Rockwell



One of my favorite depictions of two vision aids is in a 1927 painting by



Figure 55. Dr. Paul Gachet

with his spectacles and

reading glass

Norman Rockwell (1894-1978). A gentleman, somewhat advanced in years, wants so badly to read the tiny, blurred text that he enlists a large reading glass and his spectacles *simultaneously* to get the gist. Entitled *A Book of Romance*, the picture is sad and funny at the same time with the very proper old man, donned with a top hat, finding love vicariously through books while young love blooms in the next room. Note how

Rockwell makes the room so thick with literacy that shelves, desk, chairs and floor overflow with reading material.

In sum, the single lens has been an extraordinarily resilient vision aid, supporting literacy for more than 750 years. Until spectacles took off, they were the primary vision tool for reading and writing—and then held their own as a viable alternative to improving the poor vision of text. Monocular technology, as well as the plural modern nomenclature (*a pair of glasses* or *spectacles* to mean *one* vision tool with *two lenses*), gives hints as to the next step in the extraordinarily protracted development of eyewear. Now on to the intriguing story of what, in the service of literacy, may be the most important invention in the last 2000 years.

Footnotes

http://Figure.antiquespectacles.com/slide shows/non vision aids/nva.htm

¹ The British Museum originally identified this as a "magnifying glass" (not a mirror) on its website. Based on the lack of archeological evidence of transparent magnifying lens this size or any known paintings of them in this time period, I believe Beauvais is using a magnifying "mirror," much like that of St. Isnardo.

² Fleischman suggests that some experts think this actually may be a pharmacist's trowel instead of a single lens while others, like Willach (2008) contend that it is the first extant dioptrical correction aid representation. For Fleishman's comment click on the pharmacist image at

³ The first major shift in magnification technology for reading and writing came in the late 20th century with the computer and digital revolution in which the size of print could be manipulated by changing the font or letter size. Perhaps even more revolutionary is the 21st century's *touch technology* where double tapping, finger stretches and virtual magnifying glasses enlarge the letter sizes for easy viewing on small hand-held devices like smart phones, iPods and iPads.

⁴ The oldest painting I have been able to find of a hand magnifier is one pictured among alchemist's tools in a miniature from a French 14th illuminated manuscript, *The Book of Abraham, the Jew,* attributed to Nicolas Flamel (1330-1418), Paris, Bibliotheque Nationale de France, MS. Fr. 14765, fol. 1.

Double Lens Eyeglasses Part II

While single lens technology was important to better vision (of text and otherwise), double lens eyeglasses were—from their inception—*all about literacy*!

Two quotes nicely illustrated the staggering importance of spectacles for readers and writers:

Spectacles have effectively doubled the active life of everyone who reads...preventing the world being ruled by people under 40.

(Attributed to Nicholas Humphrey as cited in Ilardi, 2007, p. 3).

To men who were literate but were condemned to blurry vision never again to read, such a device must have seemed an unbelievable reprieve, a gift from God.... To no one, evidently, did it occur that [spectacles would]...help shape the course of history! (Corson, 1967, p. 9)

The invention of eyeglasses is a real historical who done it. As Vasco Ronchi so aptly put it, "the world has found lenses on its nose without knowing whom to thank" (as cited in Rosen, 1956, p. 13).

With misconceptions and questionable verisimilitude, historians have proposed various hypotheses as to how and when spectacles actually came to be (see Corson (1967); Fleischman (2011); Ilardi (2007); Holtmann (1980); Rosen (1956); Rosenthal (1996); and Willach (2008). Although the true account is shrouded in historical mire, academics do seem to agree on five major points:

- We have the Italians to thank for the invention of reading spectacles around 1285, probably in Florence, Pisa or Venice. The first extant written evidence of eyeglass development is a set of Venetian crystal-glass craftsmen's regulations in 1300 and 1301 linking glass lens directly with literacy manufacturing both "round disks for the eyes... and reading stones" and specifically "glasses for the eyes for reading" (Willach, 2008, pp. 35-36).
- 2. We also have the Roman Catholic Church to thank for spectacles' evolution and distribution. We can only guess how big a role lay artisan glassblowers and gem-smiths played in the actual inception of spectacles. However, if not directly created by monks, the innovation was certainly associated with industrious clerics who made significant contributions to the theory, development and dissemination of spectacles. "Had it not been for missionaries, man might have waited several hundred more years for this marvelous invention...." (Muth, c. 1995, as cited in Fleishman, 2011a).
- 3. *Thus, monasteries were the place to be* if you had an eye problem. Whether aging monks were the impetus for spectacles' development, the actual inventors or just the lucky recipients of the technology, clerics with

1

presbyopia and/or hyperopia (particularly writers, illuminists, copyists, and scholars in monastic scriptoriums) were the ones who significantly benefited.

- 4. Clearly optical theory lagged behind actual practice. As Ilardi (2007) concluded, "the invention did not result from the application of sound theoretical principles" (p. 28, footnote 72). Skilled artisan monks used grinding and polishing techniques known in antiquity, well before theorists like Franciscan Bishop of Lincoln, Robert Grosseteste (c. 1175-1253) and friar Roger Bacon (1214-1294) first set forth a rationale and practical application of optics, vision correction and magnification. They attempted to explain (albeit, incorrectly) why simple magnifiers like reading stones and water filled globes worked to help people read and write (see *De Iride* by Grosseteste, 1220-1235, and *Opus Major* by Bacon, 1268). Accurate modern optical theory did not begin until Johannes Kepler's work in the 17th century.
- 5. And finally, with precious little early archeological evidence and few written documents, art works —particularly paintings—have been critical in identification and dating of vision aids. Eminent optical scholars like Fleishman (2011); Ilardi (2007); Poulet (1980); and Rosenthal (1996) have followed the lead of ophthalmologist Richard Greeff and colleagues (1929) in extensive cataloguing of hundreds of public and private works of art representing spectacles from the earliest times. For, as Greeff, et al. (p. 189) said:

If we want to occupy ourselves with the history of the (sic.) spectacles, we cannot do without the works on representative art. (as cited in Ilardi, 2007, p. 261)

Another issue on which historians agree is that for over 700 years multiple problems have plagued the design of spectacles, including difficulties in making dioptric lenses for a wide range of vision problems and efficacious frames to hold the lenses. Contemporary optical specialists are still trying to find an efficient solution for maneuvering between the three "reading" distances of close, far, and mid-range vision.⁵ Construction of frames has been a particularly hard and protracted problem historically because of the awkward nature of fitting glasses to the head. Innovations to keep the glasses attached and stabilized on the face and in the correct position in front of the eyes took hundreds of years to evolve. "Spectacles frames have been one of technology's best examples of poor engineering" Drewey (2007).

In a nutshell, the evolution of double lens frame technology goes like this:

- 1. On the *nose*,
- 2. On the *temple*, and
- 3. Over the *ears!*

Nose-Fitting Spectacles

The most fascinating of all the spectacles is the first one ever invented—the *rivet*. Some ingenious monk (?) thought of riveting together two hand-held single lenses incased in wooden frames with handles turned upside-down to form an inverted V.

The earliest evidence we have of rivet spectacles are in paintings of Dominican monks by Italian artists just north of Venice in the mid 1300s.

Rivet Spectacles

Rivet nail eyeglasses (made to perch on noses) were in use continuous use for approximately 300 years from 1285-1550, an extraordinarily long time. The original frames were made of wood and bone.

Ironically, the world's oldest surviving pairs of eyeglasses were not found in Italy, but instead in Germany. In fact archeologically, almost all of the extant pairs unearthed so far are from Northern Europe and only one bone pair has been found in Italy, home of the spectacle (Fleishman, 2011a).⁶

Figure 57. Nuns' Choir at Wienhausen Abbey, Germany



The earliest riveted spectacles (c. 1330) that we have to date were found 160 miles south of Hamburg in 1953. Renovators found a cache of optics beneath the flooring of a seating area reserved for nuns attending mass (called a *nuns' choir*) at Wienhausen Abbey Convent, Germany (Figure 57). Among an array of 1000 objects (including glass cases, spectacle fragments and four later-dated leather spectacles) were several intact pairs of rivets representing three distinct types. To say the least, this was a stroke of luck

for the history of spectacles (Figure 58)! Made of wood and thin glass plano-convex lens of +3 to +3.9 D, the rivet spectacles were probably discarded in a 1310-1330 renovation. (College of Optometrists, 2011; Fleishman, 2011b; Willach, 2008).

From left to right in Figure 58, Rivet Type 1 had a straight stem; Type 2, a curved stem; and Type 3, more of a flatter bridge with lens between two layers. Type 1 and 2 had threads to tie the frame together whereas Type 3 used 2 pieces of wood glued together (see Fleishman, 2011a for a detailed description of each design).

Figure 58. Three Designs of Rivet Spectacles: Type 1, Type 2 and Type 3



Amazingly, the first extant depiction of a woman wearing glasses and possibly the earliest figurative representation of any type of spectacles is at the Church



Figure 59. Salisbury nun with rivet type 1 spectacles (1330?) and detail





of St. Martin, Salisbury, England. While the date is controversial, it could be as early as 1330 or as late as 1430-40 (College of Optometrists, 2011; Fleishman, 2011b). On an ornamented corbel (a piece of stone jutting out of a wall to give some kind of architectural support popular in early medieval buildings) is a nun wearing Rivet 1 type spectacles. The artist even simulated her pupils in the middle of the lenses (Figure 59).

The long shafts of the stems brought the rivet juncture far above the nose bridge and

Bespectacled Women

I find it intriguing that the oldest archeological examples of rivet spectacles (Figure 58) and possibly the earliest figurative spectacle representation (Figure 59) were associated with *women in convents* during the High Middle Ages. Could this evidence, indeed, point to regular spectacle usage by aging nuns to read and write?

Clearly literacy, as well as spectacles, was a male prerogative in the Middle Ages. Written records give very little indication that medieval females availed themselves of glasses. The only mention of a woman using spectacles (that I could find) was St. Francesca Bussa (1384-1440) who is said to have "read devotional books with eyeglasses" (Ilardi, 2007, p. 170).

However, other documents suggest that literacy was more widespread in medieval nunneries than initially thought. A number of sources starting from late antiquity describe convents (often founded by literate aristocratic women) as restricted communities for female refuge, study, and education. Theses sisters followed similar reading rules as their monastic brethren. Female orders such as the Dominicans were reported to be almost all literate. Particularly noteworthy in Germany from the 11th and 12th centuries, were a group of erudite abbesses who were authors, scribes and manuscript illuminators (Avrin, 1991; Fischer, 2003; Kellsey, 1999). Would not aging female writers have the same vision problems of their male counterparts?

Like the literature, art, for the most part, is silent as to nuns' use of spectacles, until into the Renaissance. Not one woman saint has been painted actually wearing glasses, even the two Patron Saints of Poor Eyesight, Ottilia and St Lucy. In an authoritative survey by Poulet (1980), only 9 % of artistic works representing eyeglasses through 1850 are associated with women. Not until the mid-1600s did painters begin depicting bespectacled females reading—Lievens and Rembrandt being two of the first artists to do so in the 1620s (see Figures 80 and 81).

Side Bar 5

between the nun's eyebrows resulting in the lens resting directly over her eyes. However, because they are not anchored to the face, it is doubtful the Salisbury sister kept the spectacles on her head for very long when she bent over to read!⁷

While a boon to the sight of aging erudite monks and possibly nuns (see Side Bar 5), the construction of rivet types precluded the practice of reading and close work for long periods of time. Stiff, rigid, heavy and very unsteady, rivets were difficult to keep on the face, although they were meant to rest independently on the nose to free the hands. Fortunately artists have pictured an intriguing range of reading behaviors that spoke to these problems-rivets held by forefingers, balanced on the nose, inverted and one-eyed.

Forefinger Rivets.

Inevitably negating the advantage of hands-free reading and writing, literates resorted to grasping the glasses by the thumb and forefinger and pressing them to the face. Figure 60 demonstrates the forehead press from the top

and Figure 62, the frame grip from the side as a means of keeping a lens directly in front of each eye.

Figure 60. Zebedee with rivet 1 type spectacles



In *Relatives of St Anne* (end of 15th century) Zebedee (Figure 60), the father of disciples James and John, holds the joint of a rivet 1 type by his thumb and forefingers up by his cap —a quite taxing position to sustain. The dioptrical lenses are positioned in front of his eyes for better vision of the sheet of writing he is perusing. On the other hand, Figure 61 shows the gray-haired *Glasses Apostle*

(probably St. Luke) in a 1403 German altarpiece grasping a pair of rivet type 3 on the side instead of the top, as he reads his book. Note that in both pictures and many examples to come, Biblical characters are depicted with Figure 61. *Glasses Apostle* with rivet type 3 spectacles



spectacles hundreds of years before they were actually invented. Indeed, "Anachronism... [has been] the most frequent and pervasive elements in artistic representations of eyeglasses...." (Ilardi, 2007, p. 262) in manuscripts, altarpieces, frescos, canvases and panels.

Nose-Placed Rivets. By far the most common literacy practice was balancing the heavy rivets on the bony bridge or lower fleshy parts of the nostrils while tilting the head downward to read or write. Of the paintings that I have found pairing rivet spectacles with literacy activities, 77% (78/101) of represented glasses were situated independently on the nose in this manner.

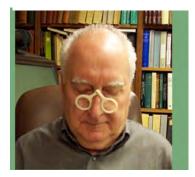
The most famous painting of this reading behavior is of Cardinal Hugh de Saint Cher (Figure 62) in the 1352 Tommaso fresco at the San Nicolo Monastery. Across the room from St. Isnardo and his magnifying mirror (Figure 16), St. Cher's image reading in his cell with spectacles (Figure 62 and detail) is most remarkable for a number of reasons: it (a) represents the earliest painting of the first spectacles that we have; (b) suggests that in the mid-1300s, scholars, indeed, had a choice of 3 different types of vision aids (single lens, mirrors and eyeglasses); (c) implies that within the culture, painters saw spectacles as important symbols of scholarship and learning; consequently (d) sparking the beginning of *anachronistically* depicting scholars or saints with eyeglasses. Cardinal Hugh de Saint Cher could not have used spectacles because he died 22 years before glasses were invented!



Figure 62. Cardinal Hugh de Saint Cher writing in his cell and detail (the earliest painting of reading glasses).



Figure 63. Dr. Vincent Ilardi wearing rivet type 1 spectacles



One consequence of resting the hinge on the top of the nose is that the readers have to direct their gaze downward considerably because the lens are at the level of the cheeks. Figure 63 shows antique spectacle historian, Professor Vincent Ilardi (1925-2009) wearing a replica of type 1 rivet glasses in much the same manner as Hugh did some 700 years earlier.

Inverted Rivets. An illumination from an Italian choir book at the Convento di San Marco in Florence (mid 14th century about the same time as Hugh's portrait in 1352), illustrates an adaptation of early rivet use, as well the common medieval textual practice (Figure 64) of group *shared reading*. A choir of tonsured monks is chanting from a large book on a slanted lectern. One grasps a double lens with a rivet from *below* like a scissors instead of from the top—an arm position much easier to sustain than Zebedee's in Figure 60.

The image of the monks also speaks to the issue of text size (see Side Bar 6) as an important consideration for aging monks participating in and/or conducting public religious services. Typical of religious choirs of this time period, a large group of members shared one extra-sized manuscript positioned on a lectern as in Figures 64

and 65. The parchment was "thick and strong enough to withstand leaning against a slanted support and being held with sash weights on a daily basis" (Boehm, 1994, p. 20). In Figure 65 and detail, a 15th century Italian miniature by Strozzi, a tall man on the far top left is wearing rivet spectacles, probably with concave lenses to help him read the extra large choral script at a distance.

Figure 64. Monk holding inverted rivet spectacles





Figure 65. Shared reading and detail of a singer with rivet spectacles



Monocular Rivets. In several works, painters portrayed older men engaged

in the curious practice of using only one rivet lens instead of two. Figures 66 and 67 depict each reader humorously clutching the left spectacle lens to his face, ostensibly using the right side as a single lens. The first (Figure 66) is a detail from an earlier painting picturing a philosopher using a single lens (Figure 30). To the right there is second scholar with rivet spectacles and head bent reading with only one eye. This 1367 fresco by Italian Andrea dei Bartoli depicts the 4th century event of 50 philosophers confronting St. Catherine of Alexandria in an attempt to undermine her faith. Catherine is often referred to as the Patron Saint of Learning and Education. Like the Tommaso fresco images (Figures 29 and 62), the image confirms that single and double lenses were used concurrently for reading during this formative period.

The Bigger the Better!

We can only guess at what the influence of poor sight had on the production of gigantic handmade manuscripts with enlarged script of the Late Medieval and early Renaissance. Illuminated Bibles and service books are replete with miniatures showing clerics reading and chanting out of tomes propped up on large lecterns, particularly in scenes celebrating the Vespers of the Dead and other daily offices. In these large shared reading events, groups of monks gathered round a single giant choir book (either a Gradual or Antiphonary) written in super-sized script and musical notation so everyone could see. DeHamel (1986) suggested that for individual reading of the liturgy, Missals (rarely illuminated) were often written in larger script so that priests could read the mass at greater distances from the altar.

Side Bar 6

Figure 66. Philosophers using single and double lenses (1367-69)



Figure 67. Reading with one eye at St. Martin's deathbed



Figure 67 shows a graying man with (white bone?) rivet type 1 design in exactly the same posture as the philosopher. The scene executed around 1480, is of several men gathered at the deathbed of Saint Martin of Tours (c. 315-397), founder of the first monasteries in France. Scenes of death like this form a considerable body of religious imagery in Christian art, as the next examples illustrate.

In Figure 68, dated 1370, an elderly disciple (in the lower left) is using his left eye to look through the right lens of a rivet spectacle. Here, the two apostles are reading scripture in a depiction of the death of Mary on the altar in Innsbruck, Austria. Remarkable about this last work, is that it is (a) the oldest surviving triptych wooden altar in the Alpine area, (b) the earliest extant representation of eyeglasses in the German speaking area (Daxecker, 1997), and (c) the first in a long line of narrative paintings of Mary's deathbed scene with one or more attending apostles using a vision aid.

Figure 68. Death of Mary and detail (1370)





Known as the *Death* or *Dormition of the Virgin*, the popular religious genre was inspired, seemingly by the story from the *Golden Legend*⁸ of 12 male apostles assembling from all over the world (and beyond the grave) to embrace and comfort the Virgin in her last hours (Thomas, 1994).⁹ Usually a few disconsolate, aging

disciples are shown consulting the scriptures. "The implication seems to be that even the wisest among scholars do not posses sufficient wisdom to heal the Virgin and change her destiny" (Manguel, 1996, p. 295).

The Death of the Virgin paintings are unique to the history of spectacles in that no other narrative thematic group has the distinction of so many works referencing the use of rivet spectacles. Symbolizing gravitas and intellectualism, bespectacled Apostles appear in at least 21 paintings of Mary's death from 1370-1510! A wonderful resource of rivet images, this thematic group of paintings brings to life three other unique early reading practices associated with spectacles: *magnified, tinted, and shared reading*.

Magnifier Rivets. Several Dormition artistic works¹⁰ picture readers using spectacle lens as simple magnifiers (as opposed to dioptric corrective lenses) by laying one directly on the words like a reading stone. In *Death of Mary* (c. 1510) attributed to the Workshop of Hans and Jacob Strueb (Figure 69), young-looking Bartholomew is flanked by an older man who holds a rivet glass cases in his left hand and rivet type 1 spectacle in his right, using the left lens to enlarge the letters. Conceivably, readers may have closed the rivet

Figure 69. An aging apostle using glasses as magnifiers

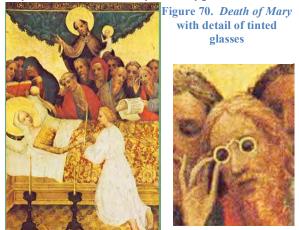


spectacles to form a single lens magnifier of approximately double strength (Ilardi, 2007), but I can find no image of that practice.

Tinted Reading Rivets. Another early German painting of the *Death of Mary* (1418) is noteworthy for documenting what may be the earliest representation of tinted spectacle glass (see Side Bar 7). To the right of the outstretched Mary in Figure 70, a bearded disciple anchors his spectacles to his nose by his thumb and forefinger with his right hand. Wearing very dark lense in ivory rivet type 1 frames,

he looks down with two others to consult the scroll.

Shared Reading. The last three examples of the *Death of Mary* (Figures 68-70) together with the *Dormition of the Virgin* (Figure 71), nicely illustrate a common reading practice with handmade books prevalent throughout the Middle Ages and early Renaissance called *small group shared reading*. In Figure 71 Mary is attended by a bespeckled,



aging erudite who shares a codex with two younger apostles. Noteworthy is the type 2 rivet frame he holds with threads that secure the tabs together to hold the lenses. The scene is full of angst with many furrowed brows and even an apostle pinching his nose in worry. According to Mangel (1996, p. 295), the glasses were not in the

original anonymous Viennese painting done in the 11th century, being *added more than three centuries* later.¹¹





Figure 71. Small group shared reading with detail of an apostle wearing type 2 rivet glasses

Whereas Figures 64 and 65 are illustrative of large group choral reading behavior typically performed orally with extremely rare and valuable extra large choral manuscripts such as *Graduals* or *Antiphonaries*, small group shared reading was generally executed with a more normal sized codices (probably also costly and precious) and usually entailed either oral or silent reading of two or three people. Clearly a defining literacy practice of the Middle Ages (before the printing press and wider access to books), small group shared reading is depicted in scores of manuscript illuminations starting late 12th century. Groups of three (mostly males) huddle around one text during church services and in educational related settings at monasteries and universities.

Handmade manuscripts were costly and time consuming to produce and few in number. Universities under church leadership in the 14th century having limited original texts, supplied one for every *three* students (Fischer, 2003). In addition to the restricted number of books, another reason for collective reading as in scenes like the *Death of Mary* may have been a pragmatic one. Clutching spectacles to one's face, holding the open book, turning the pages and deciphering the text all at the same time had to be a challenge—gratefully shared with others.

Tinted Tidbits

The first written reference of someone actually peering through a colored lens to aid vision was made by Pliny, the Elder (23-79 CE) the famous Roman scholar in 77 CE. He described Nero using an emerald to better view a contest of gladiators. The oldest surviving reference to colored glass used in spectacles was in a 1459 Portuguese document (Ilardi, 2007, p. 127).

Significantly, however, early religious paintings and manuscript illuminations started picturing eyeglasses with varying degrees of color around 1380. Lenses ranged from a slight grayish color to almost black; light green to a heavier greenish tint or blue-ish hue, and even a dark brown.

Why tinted glasses? The explanation has several facets:

- 1. The first lens materials were naturally colored. Pebble quartz or beryl was a sea green stone or aquamarine as well as a smoky gray color (Rosenthal, 1996, p. 38).
- 2. Various substances to tint glass would have been easy to add in the early manufacturing of spectacles (Ilardi, 2007, p. 127).
- 3. From the beginning, the tint was believed to have beneficial effects for weak and watery eyes. Green, in particular, was thought to be therapeutic and relaxing to the eyes.
- 4. The color offered protection from glare, "white paper reading, " dust, and smoke.
- 5. Today tinted eyeglasses and therapeutic specialty-tinted contact lenses are used for children who have reading problems and for prevention of headache in migraine sufferers.

The following are several interesting tidbits about colored glasses: In the 17th century tinted glasses were especially popular for helping poor vision. Samuel Pepys who had much trouble with his eyes, wrote in his diary in 1661 that he bought a pair of green spectacles that he found most efficacious and "managed to pore over handwritten official papers by candlelight the rough long winter evenings" (Davidson & MacGregor 2002, pp. 7-8).

In the 18th century, James Ayscough first started using tinted glasses of blue and green hue to help correct certain vision problems but it was not until Sam Grant introduced sunglasses in 1929 to protect eyes from the sun that our modern shades were born (Lipson, 2008).

Today the painting of John Lennon wearing his iconic retro-Windsor "English working" prescriptions glasses with trademark yellowish-orange tint by Andy Warhol (1995) is worth an estimated 2.5 million dollars!

Side Bar 6

Bow Spectacles (Rigid or Round Bridge)

Art works featuring spectacles tell a story of significant advances in frame design and materials occurring from 1450-1500s when lenses were connected by an arched nosepiece becoming a single unit instead of two riveted pieces. Referred to as *bow, rigid bridge or round bridge spectacles*, the glasses were commonly made of leather although other materials such as iron, wood or bone were sometimes used. With a "continuous solid curved single nose bridge," bows co-existed with the rivet Figure 72. Oldest surviving leather bow spectacles (c. 1520), Wartburg Castle, Eisenach, Germany



types, gradually superseding them by the mid-1500s (Fleishman, 2011a). Although they did tend to pinch the nose, leather (and later wire) round bridges were somewhat more flexible, lighter than wood or bone, and did not slide as easily off the nose. Some had ridges or 3-4 strips across the bridge (called *split bridge*) that allowed for some spring to clasp the nose better (far left example in Figure 72).

Leather Wires. According to Dr. Fleishman, "leather frames had a relatively short life span from the 16th to the middle of the 18th century. Few have survived to the present day time and those are highly sought after" (2011c). The earliest surviving leather bow spectacles (c. 1520) (both round and split bridge) were found in 1867 at Wartburg Castle (Figure 72), Nuremberg in the study of Willibald Pirckheimer (1460-1530). He was a close friend of both humanist Erasmus and painter Albrecht Durer who made several portraits of Pirckheimer.

A famous painting of Jan Van Eyck's (c. 1390-1441)) pictures one of the earliest representations of leather rigid bridge glasses (Figure 73 and detail).¹² Indeed, *The Virgin and Child with Canon van der Paele* (1436) is remarkable for a number of reasons. The real-life donor Peale (the person who paid for the painting) kneels on the left, holding a service book wrapped in a book cloth protector as his hand is clutching the bridge of a pair of beautiful leather convex bow spectacles he has just removed. As he thinks about what he has read, the Canon's features are grave and meditative, his aging form shown in striking realism with facial folds and balding scalp. Praying for entrance into heaven through Mary's intercession, "The inscription on the frame tells us that Van Eyck painted the panel at the behest of George van der Paele (1370-1443), a canon at the Church of St. Donatian in Bruges, to which the work was presented as the clergyman neared the end of his life" (De Rynck, 2004, p. 30).



Figure 73. *The Virgin with Canon van der Paele* and detail of leather fixed bridge



Based on the paintings of leather fixed bridge spectacles, the conventions for wearing them seem similar to rivet glasses; holding them on the side of the frame in front of the eyes, pressing them to the nose, employing them as a single lens, or hanging them independently from the nose.

For instance, Lorenzo Costa, the Elder (c. 1460-1535) depicted another bespeckled ecclesiastical canon intently reading a musical score with a leather bow spectacles

tuck securely on the bridge of his nose as his head is tilted forward intently to read. This remarkable 1493 picture of the Bentivoglio Family (Figure 74 and detail) is one of the first known Italian family group portraits (Borobia, 2011). Costa worked for the Court of Giovanni II Bentivoglio in Bologna from 1488-1507 where he executed a number of portraits of the family including this unfinished canvas that incorporated his self-portrait in a black hat at the lower left.

Figure 74. *Group Portrait of the Bentivoglo Family* and detail of a bespeckled canon



In Figure 75, a nearsighted man, holds his leather-framed spectacles by the round bridge to his nose, tilting them forward to read the Christ's message on the ground in Mazzolino's *The Adulteress before Christ* (early 16th c). A unique example of a glass case to carry and protect the bows hangs from his belt.

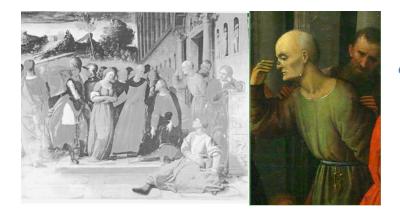


Figure 75. Adulteress before Christ and detail of leather bows and glass case

Whereas the theme of *Mary's Death* personified rivets, that of *Jerome Reading (or writing)* epitomized rigid bridge spectacles. The next four paintings are illustrative of scores of examples associating Sophronius Eusebius Hieronymus viz., Jerome (340-420) with various types of bow spectacles and literacy.

Figure 76. Example of a Van Cleve Jerome vanitas painting with detail of bow spectacles





From 1510-1550, Dutch painter Van Cleve painted a series of renditions of Jerome in his study. The saint usually is pointing to a skull with bow spectacles lying close by on the table as in Figure 76 *and detail* owned by the British Optical Museum, London. Jerome surrounded by his writing tools, is weary from composing and has momentarily laid his glasses down on the table. "The writing in the Bible is legible.

The words, in Latin, appear to be those at the beginning of Psalm 51: 'Have mercy upon me, O God, according to Thy loving kindness''' (College of Optometrists, 2011a). The rest of the quote could well have read, *and you gave me glasses in my old age*!

Like rivets, readers must have used bow spectacles as monoculars, too. A striking 1621 painting by Georges de La Tour (1593-1652) shows Jerome holding leather rounded bridge glasses by the right lens and looking through the left lens (Figure 77). The spectacles are half way between his eyes and the letter he holds; ostensibly the bow as a simple magnifier to enlarge the words much as the apostle does in *Death of Mary* (Figure 68) some 250 years earlier.





Figure 78. *St. Jerome Reading* (1652)



In a later painting (1652) of the same name, La Tour pictures the Church Father holding his specs on the fleshy part of his nose (Figure 78) like the Mazzolino's myopic reader. At the bottom left, the artist includes a wooden case among the instruments and vanitas elements. This painting is one of the last in a long line of Jerome portraits with spectacles that are in the vanitas-study genre. Prototypes began with the Tommaso image of Jerome surrounded by writing artifacts including the horned mirror (1352) and Colantonio's *St Jerome in his Study* (1445) with its profusion of literary tools and the earliest association of Jerome with spectacles

(Figures 18 and 19) (see Side Bar 8).

Nuremberg Wires. A new form of rigid bridge spectacle frame appeared in early 17th century Germany and is a prized item for antique spectacle collectors today. *Nuremberg wires* were comprised of a "single length of stiff wire usually

copper which forms both the rim and the bridge" (Davidson & MacGregor, 2002, p. 6). Mass marketed to the proletariat, they were cheap, light and could be worn with more ease further down on the nose as shown in this Jerome 1677 vanitas painting (Figure 79) by William van Drielemburg (1635-1677). With incredible detail and a touch of humor, the artist painted a crack in the left reading lens.



Figure 79. *Jerome Reading* and detail of Jerome reading with Nuremberg wire spectacles



Incredibly, it was not until the 1620s that the first paintings of bespeckled females reading (with any spectacle form) began appearing. With the groundbreaking work of two contemporaries, Jan Lievens (1607-1674) and Rembrandt Harmenszoon van Rijn (1606-1669),¹³ what a beginning it was!

As a child protégé, Jan Lievens painted an image of (possibly) his grandmother reading (Figure 80) when he was between 12-14 years of age (Gurewitsch, 2009). Richly dressed in an ermine fur wrap, she is intent in her book with bow glasses resting securely up on the bridge of her nose.

Figure 80. Lievens' s Old Woman Reading (1621-23)



On the other hand, Rembrandt at age 25 painted his mother (1629) Cornelia (d. 1640). Supposedly dressed as Hannah, with the wire glasses almost to the tip her nose

(Figure 81).¹⁴ The exquisite lighting effects with the luminous tome and the aging, yet glowing face full of passionate reading of the word (or light) of God make this the obvious masterpiece of the two for any bibliophile.

Figure 81. Rembrandt's mother wearing wire spectacles (1629)



Jerome, the Anachronism Icon!

The most painted of all Western Church Fathers is Sophronius Eusebius Hieronymus (340-420), known to us as Jerome. First appearing around the 10th century, early manuscript miniatures began venerating Jerome in typical author portraits that harks back to antiquity—writers composing at a slanted desk in an architectural setting using only pen, knife and book or scroll.

A book on Jerome by a Bologna University professor in the 1300s was largely the impetus for the popularity of a different image of Jerome as a scholar in a profusion of literacy paraphernalia (Meiss, 1970, p. 169). This superabundance of artifacts in a limited space was a persistent icon, repeated scores of times from the early Tommaso fresco in 1352 (Figure 18) through the 18th century. Objects included (a) *literary artifacts* (rule, pen, red/black ink, inkhorn or portable pots, scissors, manuscripts, scrolls, writing desk or lecterns, and sometimes legible mottos or a Psalm quote), (b) *religious references* (rosary, beaker of red liquid, Bishop's hat, stone and lion); or (c) *vanitas elements* (hourglass with sands of time, skull, extinguished candle, and of course, *spectacles*.

There were several reasons for artists to pair spectacles with Jerome some 800 hundred years *after* he lived: glasses were symbols for (a) old age, bodily decay and inevitable death; (b) learning and wisdom; or (c) authorship demonstrating illuminated or sharpened sight, i.e., Jerome's clarification of the word of God through his Bible translation. After all, Jerome was the quintessential scholar of the Catholic Church.

Because there were so many anachronistic paintings of Jerome that included spectacles (approximately 60 at my last count), their invention is frequently attributed to Jerome. Particularly in the late Middle Ages and the Renaissance, this belief coupled with the fact that Jerome complained of vision difficulty in his later years, lead many to regard Jerome as the Patron Saint of Glassmakers and Spectacle Makers. He correctly was the Patron Saint of Librarians, Scholars and Translators and Writings because of his masterpiece, the *Latin Vulgate*.

Thus, while artists have aided our modern day historians in documenting the use and development of spectacles, they also contributed greatly to the historical confusion of their origins. Fashioned by artists' works, *Jerome became the anachronistic icon of spectacles!*

Side Bar 7

Head and Cap Spectacles. In rare depictions, painters have given us a sense of another unique way to keep glasses on the nose, viz., attached to hats. First representations (Figure 82) were rivet frames held by headgear (1417); later (1768), wire bows dangled by chords from caps (Figure 83). Almost 500 years after the invention of spectacles, literates were still trying to stabilize lens in front of their eyes—seemingly never having considered the use of ears as an anchor!

Figure 82. Earliest representation of a cap spectacle (1st half of 15th century)



ļ

Figure 83. 18th century cap spectacles



Thread Loop Spectacles. One exception was the Spanish who were way ahead of the curve and did use the ears to anchor *thread loop spectacles*. Documented around 1500, the Spanish put weights at the end of the cords that hung over the back of the ears (Fleishman, 2011c) to further secure the glasses. By 1600, thread loops were common with the elite, and large prominent spectacles were status symbols as represented in one of El Greco's finest paintings (Figure 84).

Identified as Cardinal Don Fernando Niño de Guevera (1541-1609), the Grand Inquisitor and Archbishop of Seville is wearing bow spectacles with strings looped around the ears.

His finely wrought features framed by a manicured, graying beard and crimson biretta, the sitter is perched like some magnificent bird of prey in a gold-fringed chair, his dazzling watered-silk robes, *mozzetta* [elbow-length cap] and lace-

Figure 84. *The Portrait of a Cardinal* (c. 1600)



trimmed *rochet* [vestment] flaring out like exotic plumage. The roundrimmed glasses confer on his gaze a frightening, hawkish intensity as he examines the viewer with an air of implacable, even cruel detachment, his right hand impatiently almost convulsively grasping the armrest. (Davies & Elliot, 2003, p. 282)

Pince-nez (French for "pinching the nose")

Pince-nez glasses were the last iteration of nose spectacle design to evolve. Often called *nip nose* spectacles, they were much smaller and lighter than earlier bow glasses and clipped to the bridge of the nose with a spring, giving an old world look. They came in an array of shapes and kinds: folding, hinged, rigid bridge, C-bridge, spring bridge and rimless. With adjustments to better fit noses of all shapes and nose pads for comfort, they had a minimal feel, flattered the face and were quite practical for literacy endeavors.

First appearing in the 1840s, pince-nez were, in truth, the descendants of the bow spectacles and an archaic throwback to the nose spectacles of by-gone years. "At the peak of popularity from 1885 to 1919, pince-nez accounted for roughly sixty-seventy percent of all eyeglasses worn in the US " (Alan, 2008), worn particularly for reading until their eventual demise in 1930s (Rosenthal, 1996).

Nose squashers, as pince-nez were called, had a few failings, however. Their main problem was that they could not be worn comfortably for extended periods of time. With that in mind, they were designed for taking on and off frequently and had simple chords, ribbons or chains attached to small loops on the side of the frame. However the chords could drag down one side and distort the vision correction

function (see Rosenthal, 1996, pp. 236-257). Furthermore, because lenses had to be quite close to the eyelids, sometimes the lashes had to be cut for comfort.

While both an upper and middle class phenomena, pince-nez spectacles were particularly embraced by the elite and professional writers, artists and politicians who could afford precise fits by opticians (Alan, 2010) as typified in the three portraits of Zola, Degas and Roosevelt below.

Underscoring their importance in his literary life, Émile Zola (1840-1902) novelist, playwright, and journalist had numerous photos taken of him wearing pince-nez and also one famous 1868 painting (Figures 85-86 and detail) executed by Edouard Manet (1832-1883). In the latter work, note the nose spectacles attached to a chord around his neck, peeping out near the spine of the open book on the far bottom left of the detail—easily accessible at any time.



Figure 85. Zola in pince-



Figure 86. *Portrait of Emile Zola* by Manet (1868) and detail of pince-nez



In an 1875 painting (Figure 87) by Marcellin Gilbert Desbourtin (1823-1902), Edgar

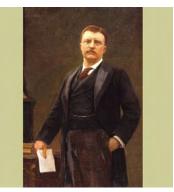
Figure 87. *Edgar Degas* by Desbourtin (1875)



Degas (1834-1917) reads the newspaper with adjustable and hinged nose nips—one of two pairs that he owned. Although the famous impressionist painter had only mild myopia and astigmatism and could read most print without glasses, he had chronic and progressive eye disease starting at thirty-six years of age. The neutral gray-tinted spectacles in the Desbourtin portrait were probably a form of treatment "which blocked out 85% of the incoming light" (Marmor & Ravin, 2009, p. 189). The retinal disease possibly drew Degas to create in pastels and sculpture and clearly affected the visual components of his work. As Marmor suggests, by midlife the paintings of Degas became blurrier with "the shading lines and details of the face, hair and clothing...progressively less refined" (White, 2007).

The 26th US President, Theodore Roosevelt (1858-1919) was quite attached to his pince-nez glasses owning multiple pairs. He was pictured numerous times with his C-bridge type pince-nez glasses as in Figure 88. They went far in creating the popular image of Teddy as a jaunty, intellectual and energetic president. A number of other US Presidents wore pince-nez including Woodrow Wilson, Calvin Coolidge and Franklin. D. Roosevelt.

Figure 88. *Theodore Roosevelt* by Becker-Gundahl (1925)



Temple-Fitting Pressure Spectacles with Rigid Sides

Obviously, nose spectacles did not solve the persistent problem of how to hold spectacles securely and comfortably on the face. FINALLY in the early 18th century after almost 450 years, an Englishman did find a solution! London Optician, Edward Scarlett is credited (although not confirmed) with the invention the first rigid sides, adding them to bow or C-bridge frames with round lens. Unlike the modern spectacle frames though, this next innovative transformation did not rest on the ears, but instead was kept on by pressure above the ears on the temples.

Short-Armed Temples

Figure 89 shows an example of the world's oldest pair of glasses with sides, the *Scarlett Temples*, produced 1728-1730. At first swirls (Figure 89) were added—then rings (Figure 90) to the ends of short stems to put the stress on the side of the head and help take it off the nose. Early models were made of iron or steel (Corson, 1967; Rosenthal, 1996) and Europeans called them *Ringside Spectacles* (Spectacles and Sunglasses, 2005).



"One facet of the use of temples quickly became evident, their concurrent use with the wearing of wigs" during the Rococo period, when they were popular in Europe and America (Rosenthal, 1996, p. 111). Consequently, early temples became known as *wig spectacles* with sides stopping on the temple before the wig. Later straight arms were lengthened with tips (most commonly teardrop finials) to more deeply penetrate wigs or hats (Figure 91) for a more comfortable fit.

Figure 92. Portrait of Daniel Nikolaus Chodowiecki, German painter and printmaker



Sporting a pair of Scarlett-type spectacles, Daniel Chodowiecki (1726-1801) famous painter and one of the most popular German engravers and graphic artists of the 18th century, is taking a minute to rest his eyes from reading (Figure 92). Anton Graff (1736-1813) the artist of this portrait also painted himself wearing short-armed Scarlett Temples like Chodwiecki and as Chardin a few decades earlier, an eyeshade while at his craft.

Arguably among the most famous painters of the 18th century, Jean-Baptiste-Simeon Chardin (1699-1778) was one of only a few artists up to this time who painted themselves with glasses. Chardin first painted a self-portrait wearing bow round nose glasses (*Figure 93*) in 1771, and several years later,

temples—proudly, almost arrogantly declaring his seventy-year-old self in need of spectacles for close work as he aged (Figure 94). Note the two different areas of the nose on which the glasses rest and how Chardin would have read and painted differently—looking down through the glasses clamped low on his nose or directly through the lenses.



Figure 93. Chardin in bow





In the desire to keep painting through his later years, Chardin adjusted to failing sight by taking up pastels that allowed for a more fuzzy medium, experimented with different types of glasses for better vision; and as in Figure 94 used an eyeshade to block out light and brighten the colors as he painted (see Side Bar 9). His headwear, relaxed costume of an artist at home, and large tortoise shell temple frames with stems are almost laughable yet at the same time "belied by the man's shrewd, concentrated gaze, and the firm set of his jaw and mouth" (Hustvedt, 2005, p. 41).

As we will see in the final section on lighting advances, the 1700s were a hotbed of technological advances in spectacle frames and lens design. Numerous creative innovations surfaced during the century, notably three alternate types of extension-type rigid side arms and three new optical lens forms.

Extensions: Sliding Adjustable, Turn-Pins and Double-Hinged Temples

Chardin's spectacles in Figure 94 could well be adjustable *sliding temples* to fit further back under his headwear. Wrap-around temple models like these flourished into the 19th century. *Sliding temples (sliders or adjustable)* retracted for storage or extended the arm out to

White Wall Effect

Chardin, as well as other artists, found that an eyeshade made colors more distinct, and often wore one while painting. When viewing paintings at art museums, try this technique to counteract the glare of bad lighting and the *white wall effect*, which makes every painting on a light wall seem relatively dark. Cup your hands like a tunnel and look through it to the painting. Like Chardin, you will find the light infiltration will be less and the colors will be brighter (see Marmor & Ravin, 2009, p. 48).

Side Bar 8

fit past the temple and around the head, as in Figure 95. *Turn-pins* with swivels that rotated 360 degrees to fit the owner's crown were added to the side-arms as in Figure 96 and the *double-hinged* spectacles, invented by James Ayschough in 1752, had two sections that

lengthened the stem and folded inward to clasp the head as in Figure 97.





Figure 97. Double-hinged temples



Another famous artist of the 18th century painted himself with temple spectacles in his later years. Known for his wig spectacles with turn-pin sides (worn over his wig), Sir Joshua Reynolds (1723-1792) (Figure 98), as with Chardin, struggled to be a productive artist and scholar as he aged. In the mid-1780s, he described the sudden blindness in his left eye as "a curtain falling across his face" (College of Optometrist, 2011b). The strength of Reynolds' two pair of surviving spectacles indicated that he was very myopic (-4 to -4.75 D). Figure 99 pictures an actual pair Reynolds' turn-pins with round lens, silver frames and medium teardrop finials accompanied by a green glass case, typical of the time.



Figure 98. Self-Portrait of Reynolds and detail of Reynolds in wig turn-pins



Figure 99. Turn-pin temple glasses and case belong to Sir Joshua Reynolds



Patrick Henry (1736-1799) was known for his round double-hinged temple frames (Figure 100), but not resting on his nose. At least seven different paintings show his glasses with the hinges swung open to hold the glasses perched on his head—much like we wear reading glasses today atop our heads, ready for pull-down access (Figure 101).

Figure 100. Surviving double-hinged temples owned by Patrick Henry



Figure 101. Patrick Henry by Thomas Sully



Martin's Margins

A collector's item today and certainly one of the most unusual styles of temple spectacles was *Martin's Margins* worn by British society, in particular, until the



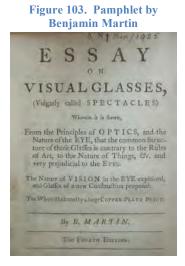
early 19th century (Figure 102). From the 1750s until his death, London optician Benjamin Martin (1704-1782) marketed his *visual glasses* with their inner ring of horn inserts designed to reduce the amount of light entering the eyes. His "medicine for the eyes" was bi-convex so the innovation was not available for myopic readers. For the most part ineffective, visual glasses were notable in that they are one of the first adaptations in which an optical innovation

actually changed the very

appearance of the frames. (See College of Optometrists, 2011c; Corson, 1967; Fleishman, 2011d; Rosenthal, 1996).

Defending his invention, Martin wrote in a 1756 pamphlet (Figure 103) An *Essay on Visual Glasses* (*Vulgarly called SPECTACLES*).... that

> Action of Light upon the Eye tends gradually to weaken it, the common Size of Spectacle-Glasses pours in upon the Eye-Ball three Times as much as is necessary for this Purpose; and therefore is very



prejudicial to the Eye in this Respect, as in Time it makes them weak and watery.

(as cited in College of Optometrists, 2011c)

As for an aging reader and writer, Martin described the plight of the poor-sighted who no longer had a literate life:

...How forlorn would the latter Part of most Men's lives prove, unless Spectacles were at hand to help their Eyes, and a Little Piece of Glass supplied the Decays of Nature? The curious Mechanic, engaged in any Minute Work, could no longer follow his trade than to the 50th or 60th Year of

his Age. The Scholar could not longer converse with his Books, or with an absent Friend in a Letter. All after that would be melancholy Idleness, or he must content himself to use another Man's Eyes for every Line. (as cited in Corson, 1967, p. 69).

Figure 104 is a rare example of portrait of a person wearing visual glasses. The sitter, Admiral Peter Rainier (1741-1808) was a British naval officer in whose honor Captain George Vancouver in 1792, named the great peak in Washington State "Mount Rainier." The Admiral obviously was proud of his Martins as he posed for several portraits in them.





Four Lens Spectacles

A more important optical innovation than Visual Glasses was the four-lens spectacle, because of their literacy versatility (viz., seeing close and distant print clearly). One set of lenses could be used alone for far-away reading or a second pair could combine with the first for better sight of print nearer at hand. As illustrated in Figures 105 and 106, two different designs were patented, the latter being more common:

In 1783, Optician Addison Smith obtained the first spectacle patent, # 1359, in London for two additional lenses hinged above the distance correction and capable of being rotated down for close work (making a total of four lenses). In 1797, English Optician John Richardson conceived the idea of different four lens spectacles where the two supplementary lenses, patent #2187, could be rotated in when doing close work. (Fleishman, 2011c)

Figure 105. Addison Smith four lens 1783 design



Figure 106. Richardson-type four lens design with sliding adjustable sides and teardrop finials (1797)



As he looked out over the crowd at his first inauguration in 1829, Andrew Jackson (1767-1845), our 7th President, "wore two pairs of eye glasses: one currently on his eyes, and one—his reading lenses—thrown on top of his head" (Brands, 2005, p. 410). A few years later, Philip Hewins (1806-1850) painted him as solving the two-spectacle problem with 4 lens Richardson-type glasses. Often referred to as *side cups*, Jackson's reading lenses flipped back toward the ears in as seen in Figure 107 detail.

Figure 107. Detail of Jackson's oval four lens spectacles



Bifocals

About the same time the English were experimenting with four lens technology for distance and close vision correction, Ben Franklin (1706-1790) (American author, inventor, politician and founding father), was putting his own mark on optical lens development; indeed, tinkering with a similar concept called *bifocals*, also called *double glasses or split lens*. (See Side Bar 10 for these and other examples.)

Awesome Slide Shows

Want to see more examples of temple eyewear? Dr. David Fleishman has put together exhaustive slide shows of Benjamin Martin Spectacles, Temple Spectacles, and Four Lens and Franklin Style Bifocals artifacts from various collections. Click the link below and use the pull down menu under Collections/Virtual Museum for a real antique treat! http://www.antiquespectacles.com/

Side Bar 10

While the British Optical Association claim it is a matter of debate as to whether Ben Franklin invented the bifocal spectacle lens (College of Optometrists, 2011d), Fleishman argues persuasively that Franklin was, indeed, the Father of the Bifocals (2011e).

Among the evidence that Fleishman presents are numerous letters of Franklin's including two written to his friend, George Whatley, a London merchant and pamphleteer. In August 1784, Franklin (aet. 78) complained that "he could not distinguish a letter even of large print" without them his double spectacles

(Franklin Papers, August 21, 1784).

Figure 108. Franklin's drawing of bifocals (1785)

In a second letter to Whatley, Franklin said of his "split lenses" that:

> ... The same convexity of glass, through which a man sees clearest and best at the Distance proper for Reading, is not the best for greater Distances. I therefore had formerly two Pair of Spectacles, which I shifted occasionally, as in traveling I sometimes read, and often wanted to regard the Prospects. Finding this Change troublesome, and not always sufficiently ready, I had the Glasses cut and half of each kind associated in the same Circle,



thus By this means, as I wear my Spectacles constantly, I have only to move my Eyes up or down, as I want to see distinctly far or near, the proper glasses being always ready. (Franklin Papers, May 23, 1785)

The letter included a now-famous drawing in Franklin's hand identifying the stronger lens "most convex for reading" at the bottom and weaker lens "least convex for distant objects" at the top (Figure 108).

Franklin (quite the image-maker) commissioned at least 11 paintings from 1766-1785 wearing his signature Cbridge temple rings (Figure 109)— in contrasting personas of politician, scholar and philosopher.¹⁵ Although probably wearing convex glasses by his thirties-forties for mild hyperopia (Fleishman, 2011e), Ben was not painted with glasses until 1766 (aet. 60) (Figure 110). In the French manner, he wore "the short Figure 109. Temple design worn by Franklin before bifocals



wig...favored by physicians and men of science," and sat in a classical contemplative reading pose (Chaplin, 2006. p. 193).

A century later Ben Franklin posed for several French portraits with his iconic Canadian Martin fur cap—presenting a stark contrast to the classical look and to the powdered wigs of Paris where he lived at the time (Figure 111). Chaplin (2006) suggests that Franklin's intent was to present himself as a fur-capped French philosopher such as Jean-Jacques Rousseau or Newtonian theorist Pierre-Louis Moreau de Maupertius; while Isaacson (2003) says his taciturn expression and Quaker-like dress projected quiet simplicity with "homespun purity and New World virtue, just as his ever-present spectacles... became an emblem of wisdom" (p. 328).

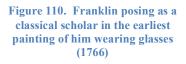




Figure 111. Franklin posing as a philosopher in a fur cap (1778)



Franklin probably began experimenting with bifocals in the 1760s and certainly was using them by the 1780s when Charles Willson Peale (1741-1827 portrayed him in Franklin's first portrait representing "double glasses."¹⁶ Remarkably, no earlier picture of bifocals exists (Figure 112 and detail). Following Franklin's lead, artist

Peale began using bifocals himself to paint miniatures and Thomas Jefferson, impressed with Franklin's double glasses designed his own oval bifocals in 1808 (Side Bar 11).

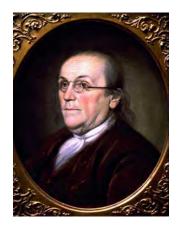


Figure 112. *Ben Franklin* with detail of the earliest image of bifocals



Jefferson's Spectacle Innovations

President Thomas Jefferson (1743-1826) wrote to John McAllister, Sr. (called America's first optician) acknowledging the convenience of the small reading glasses he had made for him, "so reduced in size as to give facility to the looking over their top without moving them" (November 12, 1806). He requested that McAllister make even smaller glasses for reading and some split lens spectacles like his friend Franklin had designed and earlier had recommended to him for reading and distance. Jefferson provided his own original sketch for the small <u>oval</u> reading frames (silver) with regular lens (as seen in *Figure 113)* as well as the strengths of the split lenses to be put in small <u>round</u> frames. Two weeks later, McAllister sent 6 pairs of regular glasses and 12 pairs of bifocal lenses from weak to strong—a common practice of that time so the wearer could adjust for the aging process over time with multiple lens (Thomas Jefferson Papers, 1806, December 1).

10,

Figure 113. Detail of Jefferson letter to John McAllister (December, 1, 1806)

In a letter to McAllister two years later (1808), Jefferson stated that he was very pleased with the double glasses, but the round shaped bifocal lens turned and brought the seam in the way of the eye. Asking McAllister to solve the problem by putting the double glasses in the small oval frames of his 1806 sketch, Jefferson said that "Altho these glasses are very small and consequently the half glasses uncommonly so, I am not afraid but that they will present full space enough for reading and writing, etc...." (Thomas Jefferson Papers, 1808, November 16). Amazingly, Jefferson's idea of combining reading and intermediate vision focal lengths in so reduced frame size did not interfere with distance and essentially gave him the advantages of trifocals (Eyeglasses, 2011).

Side Bar 11

19th Century Glasses

Except for the invention of rimless glasses (1824) and the correction of astigmatism (1827)), the bulk of the 19th century bought few major technological advances in spectacle optics or frame construction (Corson, 1967). One example will suffice to give you a flavor of reading glass habits of that time.

Historical records, paintings and artifacts of Abraham Lincoln (1809-1865) document some common literacy/spectacle practices of the later 19th century. Mildly

farsighted, Lincoln needed glasses to read in his forties. "His first spectacles, which he bought in 1856, in a tiny jewelry shop in Bloomington with the remark that he 'had got to be fortyseven years old and kinder needed them' cost him 37 ! cents" (Hapgood, 1900, p. 417). Historical accounts suggest that he used them to read major speeches, including his first inauguration and the Gettysburg address and that he seemed to take them on and off slowly and deliberately for stage effect as well as to actually see the text better (see University Archives, 2009). Experts also think that Abe had multiple pairs of eyeglasses for different purposes: to read books, newspapers and letters depending on the size of print, light available, the aging

Figure 114. Lincoln's spectacles



Figure 115. Lincoln with short temples reading with Tad



process, etc. Indeed, Lincoln had two pairs of glasses (+2.00 and +1.75 D) on his person when he was assassinated in April 14, 1865 as shown in Figure 114.

Most assuredly fit to Lincoln's specific needs, the spectacles at the top of the photo have oval lens, small teardrop finials and adjustable sides. The pair must have been repaired by the President himself —note the string in the upper right hand corner. The oval-shaped folding glasses at the bottom have delicate short temples with small circular ends and are represented in a touching painting by Franklin C. Courtner (1854-1947) after his death. The 16th President of the United States sits reading with his son, Tad (Figure 115) with thin

wire spectacles resting on his temples.

Ear-Fitting Spectacles—and Much More

Rich or poor, everyone had difficulty keeping spectacles in place... until 1880, when the first ones appeared with curved steel temples that fit snugly over the ears to hold them in place. (Kelley, 1978, pp. 60, 69)

Finally by the late 19th century, firms began making spectacles in a form we take for granted today—viz., resting on or wrapping around the ear. The application of spring steel and fine nickel to the making of full ear pieces with lighter, flexible frames in the 1880s made it possible to bend the sides around the ears, giving a better fit, increased

comfort and a more stable eye wear (Andressen, 1998; Kelley, 1978) and made spectacles more affordable (Spectacles and Sunglasses, 2005). With the advent of spectacles securely anchored to the face, no other era has produced better eyewear solutions for easier reading and writing than from the late 19th to the 21st centuries, with innovations including single-focus reading glasses, sunglasses, advanced bifocals, trifocals, progressive lens, contact lens, and most critically, individual eye prescriptions (see Side Bar 12 and Figures 122-123).

Age-Old "Do-It-Yourself" Spectacle Fitting

Choosing the best spectacle strength for glasses changed little from the inception of vision aids until the early 1900s! In fact, we still use a similar method when picking out reading glasses at the local drugstore today! In what might be called a "potluck type" reading practice, a person would decide if he/she wanted a single or dual lens and then by reading, try various trial strengths until the letters were no longer blurry or too small.

Peddlers using this type of do-it-yourself fitting were "largely responsible for the spread of single and dual eyeglasses around Europe" (*Crestin-Billet, p, 2004, p. 26*) beginning with the mass production of spectacles in Germany in the early 1500s. Numerous paintings and etchings show how vendors set up stalls in towns or came door to door to sell their wares. *Figures 116 and 117* picture this enduring practice that literally lasted for hundreds of years.



Figure 117. *Try This Pair* by Hardy (1864)



In early 1728, to help people identify the strength of the spectacles, Edward Scarlett (1688-1748) advertised newly invented side spectacles with his famous "Focus Mark" (Orr, 1985, p. 88). In Figure 118, the "70" is etched into the glass, probably meaning the lens was suitable for a 70-year-old person (Fleishman, 2011f).

Another trial-and-error method more specific to the intelligentsia was to order numerous pairs of different strengths to try out at home as Jefferson did in 1806



Figure 118. Scarlett's

Focus Mark of "70"

(see Side Bar 11.) In a 1777 letter describing the process to his youngest sister, Jane Franklin Mecom, Ben Franklin gives this advice:

... I send you a Pair of every Size of Glasses from 1 to 13. To suit your self, take a Pair at a time, and hold one of the Glasses first against one Eye, and then against the other, looking on some small Print. If the Pair suits neither Eye, put them up again before you open a second. Thus you will keep them from mixing. By trying and comparing at your Leisure, you may find those that are best for you, which you cannot well do in a Shop, where for want of Time and Care, People often take such a strain their Eyes and hurt them. I advise your trying each of your Eyes separately, because few Peoples Eyes are Fellows, and almost every body in reading or working uses one Eye Principally, the other being dimmer or perhaps fitter for distant Objects.... When you have suited yourself keep the high Numbers for future Use as your Eyes may grow older; and oblige your Friends with the others. (Franklin Papers, July 17, 1771)

By the late 19th century, shopkeepers sold eyeglasses. (As noted earlier, Lincoln bought his first pair in a jewelry store in Illinois.) By 1901, Minnesota had the world's first optometry law to protect the public against "exploitation of traveling spectacle peddlers" (Kelley, 1978, pp. 77-78).

Side Bar 12

Modern spectacle history falls into two distinct time periods: (a) the advent and development of ear spectacles from 1880-1950, and (b) the era of fad and fashion from 1950-the 21st century.

The Advent of Modern Spectacles: 1880s-1950s

The predecessors of today's hooked-shaped side arms were called *curls, curl temples* or *riding bows*, the latter stemming from its association with horseback riding. Popular around 1880-1920s, these spectacles along with a similar model called *Windsor Eyeglasses* had round lenses, a nose saddle that rested right on the nose (but no nose pads) and stems that looped somewhat tighter behind the ear than riding bows. John Lennon, Groucho Marx, Gandhi, and Stalin wore this type of spectacle, as have David Letterman, Whoppie Goldberg and the fictional Harry Potter (Windsor Eyeglasses, 2011).

Figure 119. Gauguin's selfportrait with spectacles



Gauguin and Monet. French artists Monet and Gauguin also donned an early form of ear spectacles. While Monet never painted himself with glasses, Paul Gauguin (1848-1903) did (aet,

54), eight months before he died of syphilis. In his later years Gauguin could not distinguish faces, paint or read (or write) without his glasses. According to Danielsson (1966) when the experienced editor and journalist could no longer paint, he wrote prolifically. However, in September 1902, his close friend and poet-prince, Ky Dong picked up a brush and started a painting of Gauguin; though ill, the artist finished his last self-portrait with a mirror—a grey-haired, sick man with oval fine wire-framed curl spectacles popular at the turn of the century (Figure 119).

Claude Monet (1840-1926) wore round Windsor-like tinted "cataract glasses," the thick right lens adjusted for high astigmatism after his 1923 surgery (Figure 120) on his right eye. Because he refused to have the left eye cataract removed, the thinner left spectacle lens was made cloudy to block the images so as not to interfere with the right eye's improved vision (Marmor & Ravin, 2009).



From 1910-1923 Monet's vision progressively worsened, as did his mental health. The artist's handwriting visibly changed; he had difficulty reading, painted by compensating for color distortion, and used "a style that did not require precise eyesight" (Marmor & Ravin, 2009, p. 141). Even with the special glasses he struggled the rest of his life with colors, and while he wrote the doctor in 1924 that he had

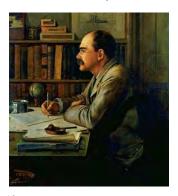
given him back, "the sight of black and white, to read and write," Monet complained that..."the vision of (this) painter is lost...(and) life is torture for me" (p. 169).¹⁷

As with painters, vision aids played major roles in the professional work and mental health of 20th century authors. Three famous 20th century writers, Rudyard Kipling,

James Joyce, and Ernest Hemingway struggled with poor eyesight that greatly influenced their production, complicated their literary lives, and affected their psychological well-being.

Rudyard Kipling. Kipling (1865-1936), as pictured by his uncle Sir Philip Brune-Jones (1861-1926), was a slight middle-aged Englishman with a distinctively large mustache. In Figure 121, he wears thick glasses in his study just a few years before he received the Nobel Prize for Literature. The small finewire spectacles curve round his ears as he pauses in his writing.

As a precocious schoolboy with myopia, scholars think Kipling suffered migraines and eyestrain from reading too much in poor light. He had to wear thick concave Figure 121. *Rudyard Kipling* in his study



glasses, earning him the nickname "gig lamps or gigger, "¹⁸ slang for spectacles (Page, 2010). One of the great Victorian/Edwardian writers, his personal letters suggest that his eye problems were exacerbated by overwork and eye fatigue, i.e. writing too long at a time. Kipling said that his headaches made "letters hop in front of his eyes" and reported that he "could only avoid the shadows (of depression) by writing until he could no longer see." (Sheehan, 2004).

James Joyce.

Figure 122. James Joyce (1935)



Fate with cruel precision, struck Joyce, like Beethoven, in the very organ necessary for the practice of his art. (Maddox, 1988, p. 189)

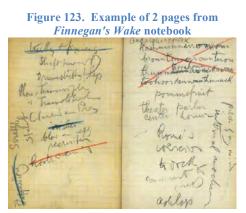
Like Kipling and Monet before him, eye problems hit at the very core of James Augustine Aloysius Joyce's (1882-1941) professional being. Unfortunately, their issues were only somewhat ameliorated by vision aids. In a painting (Figure 122) by Jacques-Emile Blanche (1861-1942), the Irish novelist, poet and playwright is turned away from the viewer because he was so conscious of the thick bulging left lens (Saywell & Simon, 2004, p. 343). While his first glasses were

pince-nez, he is best known for his iconic enormous Empire-style oval tortoise shell glasses that were all the rage in Europe. So popular were these, that one writer characterized Joyce and his fellow contemporaries as the "tortoise-shell-spectacle generation" (Corson, 1967, p. 229).

Widely considered to be one of the most influential authors of the 20th century in the development of the modern novel, Joyce's writing time was constantly high-jacked

by severe eye problems. "Visual deterioration plagued him for more than half of his lifetime" (Ascaso & Bosch, 2010, p. 60). Eye pain, light sensitivity, blurry vision and headaches required 13 different surgeries for secondary glaucoma, cataracts, and constant treatment of severe infections of the iris (*iritis*). He would have to stay in dark rooms for weeks at a time recovering. After one such iritis attack in August, 1921, that lasted five weeks Joyce wrote, "I write and revise and correct with one or two eyes about twelve hours a day I should say, stopping for intervals of five minutes or so when I can't see anymore" (as cited in Ellmann, 1982, p. 517).

Almost blind at his death, Joyce used various vision-enhancing strategies as his eyesight worsened in order to continue writing. In addition to taking five-minute breaks to rest his eyes and writing with one eye covered or shut, he (a) used multiple magnifying glasses to enlarge the letters; (b) orally dictated to various *amanuenses* including hired literary assistants, along with his wife and son; (c) used charcoal and crayons to write in large child-like print large enough for him to read; (d) resorted to strong window light and good reading lamps to see letters better (Ellmann, 1982; Gilbert, 1957; Maddox, 1988); and (e) at one point, even tried recording a few pages of his last book (*Finnegan's Wake*) which were written in letters half-inch high. Poor lightening, however, made it difficult for him to read the print (Ascaso & Bosch, 2010).



Joyce's best-known strategy was his famous notebooks. He collected and jotted down ideas, phrases and words that he liked in pocket tablets (Figure 123), crossing out entries in various colors as he incorporated them in his novel, often with the use of a "huge oblong magnifying glass" (Budgen, 1932, p.

172).

Joyce's struggle to write and see what

he wrote was critical to the content of his stories as well as his day-to-day writing process. Kaplan (2008) suggests that Joyce's eye afflictions and poor vision were both a curse and a blessing and Joyce's rich narratives illustrating the human condition and illness, in part were due to his struggle with severe vision problems.



Figure 124. Hemingway in

Kenya (1953-54)

Ernest Hemingway. Joyce, Kipling, and Monet all suffered from depression associated with deteriorating eyesight—so too, did Ernest Hemingway (1899-1961). In fact, Valarie Hemingway's biography (2004) tells of Ernest's failing eyesight and how it irrevocably struck at the heart of what he could always rely upon—his writing. In an interview, she said that

Hemingway read approximately three books a week, as well as many magazines and newspapers. He fished and hunted, both of which required keen eyesight. The fear of losing that capacity was devastating to him. Concern about his condition interfered with his ability to write and contributed to the deep depression that led to his decline and suicide.

Figure 125. *Hemingway* by Randy Hofman (c. 1996)



The Era of Fad and Fashion: 1950s-Present Day

Spectacles are such unequivocal evidence of old age and infirmity that (people) desire to dispense with exhibiting them as long as possible.

(Dr. Kitchiner, *Economy of the Eyes*, published in 1824 as cited in Corson, 1967, p. 125)

For the most part, up until the mid-20th century, glasses were all about the struggle to read and write well— weapons against infirmities of visual impairment, eye disease or old age. As we have seen, while an insignia of

(Hemingway, 2004, p. 321).

Papa Hemingway (aet. 32) began wearing glasses in the summer of 1931 (Meyers, 1985). Early photos show him with round lens Marshfield-style models with a nose pad and thin wire-bound frames. Later in the 1950s, Hemingway was known for his masculinelooking Rodenstock Aviator-style glasses as seen in this photo taken on his second Kenya safari in 1953-1954 (Figure 124). Contemporary artist Randy Hofman painted Hemingway (1996) with his aviators in a similar writing pose but with his working literary life juxtaposed with his vigorous sports persona (Figure 125).

As an aside, P. G. Wodehouse gave some amusing advice to writers in the 1930s (like Hemingway and Joyce) for crafting the looks of fictional characters (see Side Bar 13).

Fictional Characters with Glasses—Here are the Rules!

Asserting that he thought it " absurd these days to go on writing for a normal-sighted public" P. G. Wodehouse gave these rules for writers in 1930:

- Spectacles should be worn by good uncles, clergymen, good lawyers, and all elderly men who are kind to the heroine. Bad uncles, blackmailers and moneylenders should also wear spectacles.
- Pince-nez should be worn by good college professors, bank presidents and musicians. No bad men may wear pince-nez.
- Monocles may be worn by good dukes and all Englishmen. No bad man may wear a monocle.
- Beastly tortoise-shell-rimmed things should never be worn in fiction and it is time that a stop be put to this arbitrary state of affairs (as cited in Corson, 1967, pp. 221-222).

wisdom, scholarship and intellectualism, spectacles also symbolized vanitas and the deterioration and eventual death of us all (e.g., Jerome).

Since the invention of spectacles (some 665 years before) both men and *especially* women have been self-conscious about wearing glasses in public and often did so *only* behind closed doors until mid-20th century. No wonder the female sex rarely wore spectacles to read publicly and were seldom painted with them, when academic studies like the one in the 1920s characterized women with glasses as disagreeable and Dorothy Parker (1893-1967), the author and humorist, quipped in 1937 that "Men seldom make passes at girls who wear glasses." The French encoded "Good morning glasses, good-bye girls" (Andressen, 1998, p. 27).

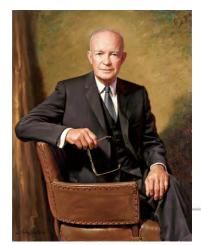
Even men had a problem. Samuel Johnson (1709-1784) refused to have his picture painted with spectacles and criticized his friend, Sir Joshua Reynolds, when the artist pictured him as shortsighted—squinting at the print unnaturally close to his nose (Figure 126). "It is not friendly to hand down to posterity the imperfections of any man," said the most famous man of letters in English history (MusEYEum News 2, 2010, p. 2). The portrait is "affectionately known as 'Blinking Sam'" (Boehm, 2006).

Figure 126. Nearsighted Dr. Johnson



More recently, others have had an aversion to appearing

in public wearing reading glasses. For instance, at his first formal address in London at the end of WWII (1946), Dwight D. Eisenhower (1890-1969) wrote his speech nightly for 3 weeks reading it aloud over and over to anyone that would listen. According to biographer Stephen Ambrose, (1991), Ike practiced the address innumerable times so that he could memorize it and deliver it spontaneously...*without* his glasses. In countless paintings and photos, Eisenhower rarely had glasses on his ears, but often in hand, as in his official Presidential portrait that hangs in the White House (Figure 127). The 34th President (1953-1961) is holding gold-rimmed *browline* glasses (Dean-of-Men style) as shown in Figure 128.¹⁹



Due in great part marketing

Figures 127-128. Eisenhower with plastic and gold-framed browline spectacles



to the strategies and innovations of

European and particularly the Americans optical communities, a fundamental change in the design of eyewear and the attitudes toward spectacles began while Ike was President (1953-1961). Manufacturers like Amor, Vogue and others began advertising glasses as glamorous for women and seriously professional for men—as depicted in a 1957 French colored lithograph (Figure 129) entitled *AMOR Lunettes*.

By the 1960s and the heralding of synthetic materials, glasses had become a fashion accessory; demanding style, comfort, and functional design. With the

Figure 129. AMOR Lunettes



invention of plastics and the combination of iron, steel and nickel with celluloid, acetate or nylon, costs came down, glasses were light on the face, creativity was sparked and colors abounded. Public prominence was no longer as much of a problem, for glasses now covered almost one-third of the face! With this fad and fashion of spectacles came one significant trend: a conspicuous lack of literacy artifacts in artwork as the following examples show.

One of the most interesting female eyewear phenomena of the 1950s and 1960s was the winged shaped glasses commonly called cateyes or bat-wings. Many were surprised when Grace Kelly wore this frame in 1955 when she visited Monaco taken-aback that a woman of such beauty would dare wear eyeglasses

Figure 130. Men Seldom Make Passes at Girls Who Wear Glasses.



in public (Crestin-Billot, 2004).

Few women had the audacity to be painted in bat wing glasses. In one rare example, contemporary painter, Alexis Smith (1985) ridiculed Dorothy Parker's quip (above) by placing the cateyes on Marilyn Monroe in a large wall painting installed at the Museum of Modern Art in San Diego (Figure 130).

Three painters distinguished themselves among the hundreds of contemporary artists in documenting spectacles as increasingly common artifacts of late 20th century society—Andy Warhol, Alex Katz and Chuck Close. Although their representational work ran contradictory to the prevailing postmodern art of the time, it is of note that theirs and most other portraits of this era had very little to do with literacy. All three portrayed large unisex browline (plastic rimmed or semi-rimmed) glasses similar to Eisenhower's, the prevailing style particularly in the 1960s and into the 1970s (Figures 131-3).

Figure 131. *Julia Warhol* (1974) by Andy Warhol



Figure 132. *Poet Kenneth Koch* (1970) by Alex Katz



Figure 133. *Frank* (1969) by Chuck Close



Aviator-style glasses had resurgence in the 1980s and through the 1990s (Figure 134). In these later decades of the 20^{th} century, glasses grew even larger in size, particularly sunglasses which were now commonly made with individual prescriptions for reading (Figure 135).



Pop artist and filmmaker Warhol (1928-1987) wore glasses continuously, particularly oversized clear acetate Morse-style eyewear (Figure 136). Warhol tended to paint celebrities like John Lennon and Iacocca, whereas Alex Katz (b. 1929)

Figure 137. *Chuck Close Self-Portrait* (2004-2005)



(Figures 132 and 135), with his colorful and bright figurative art, developed a style of portraiture that captured ordinary people peering out of large glasses that filled their faces.

One of the finest working artists today, Chuck Close (b. 1940) was more interested in depicting images of people he cared about including Figure 136. Andy Warhol with acetate spectacles (1976)



friends and fellow artists. These portraits showed eyeglasses as an important part of the personality on faces—startling in their size, sometimes 8-10 feet tall. Close, who ironically is

"face blind," (Koster, 2010) has painted a number of contemporary self-portraits suggesting that his smaller retro-oval spectacles are no small part of his identity (Figure 137).

As you might have gleaned from the last two sections on early vision aids and spectacles, sight and light are kindred concepts. Sight enhancing tools like monoculars and spectacles manipulate light for both the normal and poor-sighted — so the eye sees letters larger, clearer and brighter. It goes without saying, that good vision for reading and writing (as well as painting) requires *good light*.

With that in mind, the last section of this paper surveys the history of lighting and explores how painters portrayed natural and artificial light to illuminate scores of literacy activities through the ages.

Footnotes

⁶ The only Italian pair of rivet spectacles ever found was from Florence. The artifact is made of thin bone and is medium brown in color. An image can be seen at the Antique Spectacles and Other Vision Aids website:

http://www.antiquespectacles.com/rivet_spectacles/rivets.htm

⁷ Originally the Salisbury nuns at the Church of St. Martin lived under Roman Catholic Cistercian rule, until the 16th century when the convent converted to Protestantism.

⁸ *The Golden Legend* is a collection of tales of the saints by Dominican cleric Jocabus de Voragine (1228/9-1298). An important source for Christian iconography since the Middle Ages, artists have borrowed liberally from this 13th century book.

⁹ Sometimes the figure of Jesus is included holding Mary's soul. A younger John is often given prominence since he was charged to care for the Virgin. Peter usually stands over Mary, holding an open book from which he is administering Holy Communion. If she is still alive, the Virgin may hold a lighted candle to symbolize the Christian faith (Hall, 1979).

¹⁰ Two other works during the same time period show an apostle using spectacles as a magnifying glass: *Death of the Virgin* (c. 1500) by Maestro De L Sisla at Museo del Prado in Madrid and *Death* (1475) by Martin Schongauer at the British Museum, London.

¹¹ I have had trouble confirming this claim. The image cited by Manguel is the very same *Death of Mary* scene on the Albrecht Altarpiece, one of 22 panels of the life of Mary by the Albrecht Master executed between 1437-1439, at the Klosterneuburg Monastery. Leopold III founded the church in 1114, which was built on an older church foundation at the site of an earlier Roman fortress. A website outlining Stift Klosterneuburg's 900 year history mentions nothing about an 11th century *Death of Mary* painting. See

⁵ Often a contemporary reader will require three different vision prescriptions; one for close reading, one for medium distance as with a computer screen, and another for print far away. One modern solution has been trifocals — another more recent is Superfocus Glasses (see footnote #28).

http://www.augustiniancanons.org/Klosterneuburg/a_history_of_stift_klosterneubur. htm

¹² With the caveat that it can be difficult to tell rivet from bow spectacles in artwork because often the nose area is obscured, the earliest rigid bridge image I have found to date is represented in Van Eyck's *The Virgin and Child with Canon van der Paele* in 1434 (Figure 73).

¹³ The earliest surviving painting that I have been able to find of a woman actually reading and wearing spectacles is Jan Lievens' s *Old Woman Reading* (1621) followed by Honthorst's Old *Woman Examining a Coin* (1623) and *Rembrandt's Mother (Portrait of the Artist's Mother)* in 1629. Art historians disagree over who actually painted the last work. Bridgeman Art Library lists the work by Rembrandt, whereas Sister Wendy Beckett (1999, p. 268) stated that work was downgraded to the lesser artist, Lievens. Other scholars think that the painting was a joint effort by both artists.

¹⁴ Rosenthal (1996) suggested that this practice was less than comfortable because "pressing the glasses on the lower part of the nose caused obstruction of the nasal passages, with accompanying voice change and respiratory problems" (p. 236).

¹⁵ See Sellers (1962) for a comprehensive listing of Franklin portraits in which the great man wears spectacles.

¹⁶ Charles Willson Peale did a second painting of Franklin with bifocals in 1789 just before the inventor's death. The painter wanted to do it in life, but Ben was so ill that Peale had to base this 2nd portrait on the 1785 original (Woods, 2004, p. 213).

p. 213). ¹⁷ Monet's oeuvre (that I have been able to identify) depicting literacy events were executed in his 30s and 40s between 1870 and 1887. The artist's style was more detailed with clearer lines and more vibrant colors than later paintings. All were outdoor scenes with women reading, but according to common practice, no spectacles were in sight!

¹⁸ "A gig was a small light carriage pulled by one horse. It was lit at night by two oil lamps with thick glass, called gig-lamps. These gave a double halo effect in the dark as it approached. Today some types of glasses can be called gig-lamps when they have very thick glass like the original lamps...." Retrieved from WordReference.com: <u>http://forum.wordreference.com/showthread.php?t=867897</u>

¹⁹ According to the Vintage Eyeglass Warehouse website, plastic browline glasses of this era are hard to find because the plastic tended to shrink over time; and because the metal frames are solid, most frames cracked. See http://www.eyeglasseswarehouse.com/pages/plastic-menbrowline.html

Illuminated Literacy Part III

Vision aids extend one's artistic and literacy life into old age; whereas good artificial lighting, extends it into the night. The 18th century biographer, John Boswell wrote of struggling to relume a candle he inadvertently snuffed out after a long stint of nocturnal writing; in the 16th century, Michelangelo grappled to see in the darkness with a candle strapped to his head while painting the *Last Judgment* in the Sistine Chapel.

Both literacy (the writer and reader) and painting (artist and viewer) are visual mediums, viz., how the eye and brain receive and interpret light. Optimal lighting, even during the day, is critical. A multitude of vision problems are especially exacerbated by low or dim light. James Joyce with severe eye disease used window light to help him better see and edit his own words. Experts believe that artists active into their later years such as Rembrandt and Franz Hals (1581-1666) were plagued by the time they reached their 50s with presbyopia and as they aged depended on quality daylight to distinguish details and colors better.

Authors such as Joyce thought "light-writing" was a beautiful word for painted pictures (Budgen, 1934. p. 175) and other writers have eloquently described light and darkness in prose. Artists, however, have added another dimension—they "painted light." They brought light out of gloom; showed how light penetrates the blackness; and, indeed, painted "radiant darkness." Using a Baroque technique called *chiaroscuro* (the arrangement and bold use of strong contrasting light and dark elements effecting the

whole composition), their goal was to elicit strong emotional responses from the viewer and heighten the drama in intimate narrative scenes (Getty, 2007). Painting radiant darkness is a formidable challenge, tackled by many artists over the years, with only a few doing it *really* well.²⁰

Gerard Dou (1613-1675) was one such expert painter. In *Night School* (1663-5) we see lantern and candle lit pages with barely discernible figures gathered around their glow (Figure 138). Three candles and a fourth inside a lantern illuminate this realistic nocturnal scene of adults helping children do their lessons. Considering that a standard candle gives out about 0.01876 watts, Dou gives a pretty good sense of how Figure 138. *Night School* by Gerard Dou whose specialty was candlelight paintings



dark and shadowy the room was and how little illumination the candles actually gave.

On the other hand, some painters are guilty of greatly *exaggerating light with* scenes depicting more light emanating from a candle or lamp than possible. Art historians theorize that artists did not do this for artistic purposes but because they executed their works in poor/low light and expected their viewers to see the work in muted light as well.

An example of this practice of unrealistically representing actual lighting conditions can be seen in a colored engraving called the *Literary Club of 1781* by D. George Thompson

(d. 1870). Set in Sir Joshua Reynolds's dining room at night, the faces of the literary



Figure 139. The Literary Club of 1781

party of bewigged and some bespeckled gentlemen gathered around the table are awash with light, their features bright and clearly distinguishable. Since candles project most of their light toward the ceiling, it is highly unlikely the candelabra with only eight flames could have shed that much light on the participants (Figure 139).

The painting portrays the club's original nine members, "wits, authors, scholars and statesmen" in Washington Irving's words (1854, p. 150). On the far left is seated the

biographer James Boswell (1740–1795) with glasses. To the right, slightly in front, is author and lexicographer Samuel Johnson (1709–1784) with a large brown coat, without glasses—remember he refused to be painted with them (see Figure 126). Painter Sir Joshua Reynolds (1723–1792) with his turn-pin spectacles (see Figure 98) is in red by the marble bust.

As a literacy practice, clubs initially were exclusive and reserved for upper class educated men who met for literary conversation and discussion. In the case of the Literary Club founded in 1764 by Johnson and Reynolds, the institution flourished through the 19th century, membership rising to forty in 1914 (with the election of Rudyard Kipling) and to fifty in the latter part of the twentieth century (Sambrook, 2009). One of the first men's literary clubs in the United States, groups like these still thrive today as a place for member readings, commentaries and literature discussion— of course, with the addition of women to the ranks (Literary Clubs, n.d.). In a modern version of literary clubs, psycholinguist Frank Smith popularized the term *literacy club* in 1988, as a metaphor for the social nature of learning to read and write. The antithesis of Johnson's Literary Club, Smith issued an all-inclusive call for *everyone*, novice and expert, to join all who use written language as their life work in and out of the classroom (Smith, 1988).

The Muse del Prado painting called *A Philosopher* illustrates two other artistic light conventions (Figure 140). Dutch painter Salomon Koninck (1609-1656) used an *oblique light* source in his compositions, showing no obvious source of illumination. In this and many other works in his oeuvre, Koninck specialized in painting scholarly old men searching for the secret of everlasting life among page-worn tomes and papers lit by a mystical light.

Moreover, note how Koninick diffused the light in such a way that the eye is immediately drawn to the luminated book and pages. Whether serendipitiously or by purpose, painters have regularly treated written material in this way to make it special, using light to set off the page or paper as the Figure 140. Literacy as centerpiece in *A Philosopher* by Koninck



centerpiece of the work with a bright shimmering quality that makes the text almost seem alive. The tome that Rembrandt's mother is reading with her wire spectacles (Figure 81), seen earlier, is another exemplar of this convention that from its inception has warmed the hearts of bibliophiles and art afficinados.

Considering these artistic conventions of light and literacy, the final section explores paintings that depict different sources of light, (natural, supernatural and artificial) that allow readers and writers to see text better and illuminate literacy events reflective of broader practices.

Natural and Divine Light

Light, for humankind, has assumed many attributes over time; knowledge, truth, even enlightenment. For ages, artist have imbued the natural and supernatural (divine) light sources in their works with other symbolic associations: (a) divine light alluded to Judeo-Christian faith; (b) starlight and moonlight personified romance, poetic intensity, and other worldliness; while (c) sunlight conveyed nature and bright, fresh, and lively feelings.

Holy Light

In the Judo-Christian tradition, light is a visible sign of the divine. The Gospels refer to God as the "the Light of Men," and Christ refers to himself as "the Light of the World. (Getty, 2007)

Figure 141. *The Annunciation* by Goya (c. 1785)



Indeed, for all three major religions of the Book (Islam, Christianity and Judaism), light is a visible sign of the divine. Literally and figuratively, the contrast between darkness and light is a symbol of faith in God.

The annunciation genre is perhaps one of the best to depict how artists paint the light of God emanating from heaven. As in Figure 141 by Goya (1746-1828), works picturing the Immaculate Conception executed by the Spanish artists Murillo, Greco, Zurbaran, and Melendez are especially flamboyant and dramatic with big golden swashes of luminous beams emanating from either God or the Holy Spirit symbolized by the descending dove. The focal points, Mary and her most constant attribute, the open book, are drenched in the heavenly beams of golden light. "According to St. Bernard, Mary is reading the celebrated prophecy of Isaiah (7:14), "A young woman is with child..., and she will bear a son..." (Hall, 1979, p. 19).

Starlight/Moonlight

"It is possible to read medium-sized print by moonlight, but to do so for any length of time would strain the eye" (O'Dea, 1958, p. 1). So as you might imagine, paintings of people reading or writing by moonlight or starlight are relatively rare; however, there are a few unconventional ones of note with literacy at the heart.

Figures 142 and 143 provide an interesting juxtaposition with contrasting titles, purposes and time periods. In an unusual nocturnal scene of the Madonna reading on the holy family's flight to Egypt (1582-87), the silvery moonlight shimmers across the landscape and together with the divine light from her nimbus, illuminates the book she holds (Figure 142). In a whimsical contemporary still life treatment of nocturnal light and literacy, *The Journey* (1987) by German painter Quint Buchholz depicts a crescent moon as a gleaming bookmark, lighting up pages of knowledge in the dark of the night (Figure 143).²¹

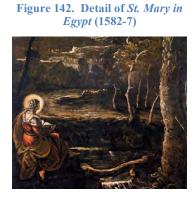


Figure 143. The Journey (1987)



Natural Light: Literacy in Daylight and Sunlight

The next section surveys examples of painters who skillfully played with the power of light and shadows, perfecting the art of direct and indirect daylight spilling on to manuscripts, books, newspapers and other reading materials, both indoors and outdoors.

Direct Sunlight. To give you a sense of the phenomenal strength of sunlight, the sun shines 168,000 times brighter than a single good candle. Impressionists loved to paint outdoor light and experiment with it. They were especially conscious of the changing colors of sunlight, and in fact, perfected special blue-ish or purple-ish tones to contrast the dazzling light with shadows. Direct sunlight is hard to read by because of the glare and requires some shade as in Figure 144. However, for those over 50 years of age and struggling with hyperopia, brighter less filtered light is a boon for "tired eyes" (Figures 145).

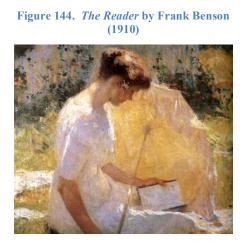


Figure 145. *Old Man Reading a Book* by Atanur Dogan (2001)



Indirect Natural Light. Indirect daylight is the best possible natural light by which to read and write without eyestrain. Ever conscious of light, medieval monasteries and scriptoriums were built in such a way that the monks could read and write in as much

Figure 146. Rendering of a 13th century monastic cloister with north walk used as a scriptorium



good daylight as possible and away from the sun's intense glare and the other outside elements. They often studied and meditated in cloisters (rectangular courtyard with covered walkways) to take advantage of the outside natural light. Since cloisters were usually situated south of the church, the north walkways received more indirect light and were the places to read and write. As Figure 146 illustrates, early monasteries used the shaded cloister walkways as scriptoriums where scribes composed or copied handmade manuscripts in good light (V & A, 2011).

Sometimes separate carrels (like we have in contemporary libraries) were open to the cloister for better

light (Figure 147). Scribes, as well as *illuminators* (who drew and painted the manuscript illustrations and decorations), would work there about six hours in good daylight, fulfilling other monastic duties when light was not as good. Because of the potential of danger from candles, writers would work until sunset (Avrin, 1991). In some cases scribes were very thankful for stopping then, as the Figure 147. *St. Thomas Aquinas* writing by a cloister



following two quotes found in the margins of medieval manuscripts attests:

Thin ink, bad vellum, difficult text.

Thank God, it will soon be dark.

(as cited in Avrin, 1991, p. 224).

Natural light streaming indoors through a window on to reading material was another light source technique used by artists in narrative art to showcase interior literate activities. Below are several exquisite examples:

Figure 148. *Scholar Reading* (1631)



Rembrandt van Ryn (1606-1669) was known as a "painter of light and shade." In fact, "the basis of his art had, from the beginning been chiaroscuro...." (Gowing, 1995, p. 716). With uncompromising realism, he powerfully crafted the whole of his compositions around the contrasts between the two elements, dramatizing and emphasizing the strong interaction of light and shadow. Some experts say he exaggerated the light and over emphasized the dark shadows (Burckhardt, 1947; O'Dea, 1958); others, he was master of them.

For the most part, Rembrandt used oblique light; however, *Scholar Reading* (1631) is one of several of Rembrandt's early dramatic presentations where in a quiet vaulted chamber he

plunged the reader and his books into a bath of gold sunlight from a window (Figure 148). In a common reading gesture, the bearded philosopher tilts the open book (propped up on several others) toward the window to better gather the light to the page. Note how the shadowed recesses executed with slow gradations of yellows, browns and blacks help the viewer perceive light to dark transitions.

Figure 149. Lady Writing a Letter with her Maid by Vermeer (1670)



Perhaps the best painter of just light was Johannes Vermeer

Figure 150. Woman Reading a Newspaper (1975)



(1632-1675) another 17th century Dutch artist. Of the 14 Vermeer paintings that picture literacy artifacts, half (7) are naturally lit genre interiors in which women are working by a

window. With details crisp and shadows skillfully rendered, *Lady Writing a Letter with her Maid* (Figure 149) is one such example. With strong daylight accenting the writing process, the woman pens furiously; the maid waiting to deliver the letter. Red sealing wax suggests the crumpled letter on the floor was just received and thrown angrily onto the floor. Confrontation and reconciliation through the written medium seem to be the theme.

In a more placid scene (Figure 150), John Koch, known for his light-filled realistic paintings, gives us a wonderful 20th century version of a mature woman's need for *both* natural window light and glasses to support the reading process.

The reality of literacy was that it was pretty much dictated by the sun and the hours from sunrise to sunset for thousands of years. Man-made illumination, in the service of literacy and the nourishment of the intellect after dark was a long time coming.

Artificial Light: Extending Literacy into the Dark

Astounding as it sounds, humankind used very primitive lighting sources up until about

200 years ago. Basically an *open flame technology*, types of illumination changed little from the birth of the Semitic Alphabet (19th century BCE) until the invention of electricity (late 19th century CE)! Battling the darkness and extending our ability to see written works into the night is the topic of the final section.

I have organized it into three distinct periods of artificial lighting technology development²² that paralleled the spread of literacy and the growing need for illumination:

- 1. Early Flame Period (Ancient times-1780),
- 2. Enhanced Flame Period (1780-1880), and
- 3. Flameless Period (1880-present).

Early Flame Period (Ancient times-1780)

...With the fire lights and the burning brand in the hand of man; the conquest of light over darkness was signalized, and the night side of man's life and his progress toward culture became a theme of surpassing interest. (Hough, 1902, p. 497)

Light was Work!

The difficulty of studying or composing by open flame light at night cannot be emphasized enough. Below is a list of just some of the challenges:

- 4 The use of fire, torches, oil lamps, and candles was stinking, smelly, smoky, greasy, messy, and dirty;
- Smoke, lampblack, grease and drippings did serious damage to plaster, painted surfaces, upholstery, as well as parchment/vellum pages of manuscripts and paper of printed books;
- Candles and lamps demanded constant attention, so that the reader/writer was interrupted every 15-20 minutes to tend the flame of candles and lamps (cleaning, gutting, and snuffing frequently);
- Seeing fine print with weak, sputtering flickering, finicky, dull and inconsistent light was difficult;
- Poor light resulted in eyestrain, deterioration and eye diseases; and of course
- There was the ever-present threat of spreading, devastating, uncontained fire from knocking over lamps/candles, explosions, flying sparks, etc.

Oh, how we take a flick of the light switch for granted!

Side Bar 14

Essentially from the dawn of writing, literates have had four choices of artificial illumination to release them from the bonds of darkness. These were universally dependent on burning material: (a) firelight, (b) torches, (c) oil lamps, and (d) candles. Colonial lamps differed little from those found in the Tombs of Ur in Mesopotamia some 5,000 years ago; candles (up until 1850s) were no different than, the Younger (61-112 CE) described in 100 CE (Perry, 1969). For eons, both reading and writing by crude open flame were exceedingly cumbersome and challenging as compared to the lighting technology of today (see Side Bar 14).

Firelight. Wood fires begin the history of artificial illumination; for they were, indeed, the first lighting technology. As Luckiesh (1920) suggests, "Fire not only

banished the chill of the night but was a power over darkness.... The march of civilization had begun" (p. 4).

While painters used firelight to symbolize hell and damnation, they also portrayed the ancient practice of reading by firelight, sometimes realistically and others, not. Eastman Johnson's *Boyhood of Lincoln* is a stunning example of a faithful rendition of firelight (Figure 151). This true-to-life portrait with the firelight flickering on the open pages of the book turn toward the bright flames is one of self-education in progress.

In contrast, see how Solomon Alexander Hart portrayed the common recreational practice of reading aloud in front of a hearth in the 19th century (Figure 152). The woman's dress is appropriately bathed in firelight, but the lighting is wrong for the elderly man on the left and particularly on the surface of the book. Ostensibly entertaining the group with Shakespeare, the gentleman is holding his book the wrong way to catch the firelight!

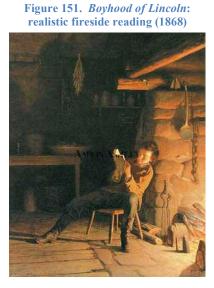


Figure 152. *An Early Reading of Shakespeare* (1883) by Hart



Torches. With the light of the fireside came the torch (aka, burning brand), next in lighting development chronology. As the first portable independent artificial light, the torch has a different history from lamps, ancestor to rushlights, tapers and candles and "predating the most primitive forms of lamps" (Robins, 1939, p. 6).

With little archeological evidence surviving, we do not know when early man began to use torches or how much they used them for literate activities. The Greeks used torches exclusively up until the 6th century BCE when lamps were introduced. At first they used bundled sticks treated with wax, resin, or pitch and later, metal or clay shafts with hollowed-out tops stuffed with oil soaked rags (Robins, 1939). Homer's poems (c. 7th century) mentioned pine torches. Those in medieval times had bundled ropes soaked with pitch (DiLaura, 2006, p. 88). More recently accounts described the poor in backwoods America using pine natural torches (called light-wood knots or candlewood) as their only domestic illumination—even as late as the Civil War era in the south (Robins, 1939; Handy, 1876)

Torches gave off a bright warm glow, but reading and close work "done by their flickering light was a terrible strain on the eyes and the heat from the blazing wood was uncomfortable in the summer. Moreover, the pitch smoke was objectionable and blackened the walls." (Handy, 1876, p. 577).

Torches were common artifacts of Jerome's time; so conceivably he would have used them to write by, as in this painting. *St. Jerome Meditating* (1525) by Jan Cornelisz Vermeyen (1500-1559) shows the great writer alit by a flaming torch as he Figure 153. St. Jerome Meditating by the light of a torch.



ponders death (Figure 153) with iconic leather bow spectacles lying on the open book. For dramatic effect, the light thrown by the burning brand is greatly exaggerated in this highly unusual portrayal. Notice how unrealistically the flame illuminates the putti and even the saint himself. "The skull, symbol of earthly vanity, is literally overshadowed by Faith in the shape of the torch borne by the angels, representing the light of Christian Truth" (Louvre, 2003).

Oil Lamps. While torches heralded the beginning of night life for the Stone Age man, a different technology emerged along side of it that would have a more profound impact on literacy, that of the oil lamp. Cleaner and easier to tend than torches, simple oil lamps (with wicks of vegetable substances) were the main source of light after dark for most domestic and literacy activities throughout the western world up through the 20th century.



Stone Lamps. The first real lamps of history were *stone burners.* Initially, early man used naturally formed rock crevices; then eventually, crafted portable hallowed circular depressions from limestone or sandstone. Limestone had the advantage of not getting too hot; whereas most sandstone lamps because they were better heat conductors, had handles. One lamp put out a dim flickering light less than a standard candle's worth, but nonetheless "sufficient to guide a person through a cave or to illuminate fine work" (de Beaune & White, 1993).





Remarkably, the discovery of possibly the earliest extant lamps provides a wonderful confluence of the histories of art, literacy and man-made illumination. The first evidence of artificial light usage specifically related to literacy are found on cave walls and ceilings in prehistoric cave painting sites in Europe, some as old as 32,000 years. Evidence suggests that Upper Paleolithic man "began 'writing' with cave drawings to communicate

information through pictures," the step before the hieroglyphics of the ancient Egyptians (Wongte, 2010). Without artificial lights that included open fat-burning lamps, as well as small fires and torches, man obviously could not have painted or, for that matter, viewed theses graphic Ice Age images hundreds of feet underground.

One of the most spectacular finds by Abbe Andre Glory at Lascaux, in southwestern France, was the spoon-shaped lamp in Figure 154. Made of red polished sandstone, the burner (8 ! inches long) with a shallow oval cup used deer fat for fuel and a wick made of a quarter-inch juniper branch. The handle was decorated with two abstract signs of chevrons (Eshleman, 2003, p. 182).

Figure 155. Artist's impression of cave painting with stone oil lamps



Figure 155 depicts an artist's rendering of how a few oil lamps may have illuminated the painting process. Jane Brox suggests in her new book *Brilliant* (2010 pp. 7-9), that deep in pitch black caves of Lascaux, humans used no more than a handful of lamps to paint these murals; and if carbon dioxide built up, they would have had trouble keeping those lamps lit as they worked. While torches probably supplemented the few lamps, it was so dark that achieving the full color ranges as we see the image today would have taken 150 lamps (de Beaune & White, 1993).

Open Bowl or Saucer Lamps. The next step in lamp technology was the simple bowl type made from clay and glass with lip or groove to hold the wick. Often in olive or some other vegetable oil, the flame would burn with the aid



of the wick made of rush or twisted strands of linen and then put itself out when the oil was used up. Like other variations to come, the lamps were portable, put in stands of varying heights, or hung by chains as in Figure 156.

Notice the putto is using a torch to light the open bowl oil lamp to luminate the Erythrean Sibyl's tome.

The Greek and Roman Lamps. From the 6th -3rd

Figure 156. *Erythrean Sibyl* and detail of a saucer lamp



centuries BCE, the inventive Greeks introduced more sophisticated pottery with spouts (nozzles) and handles for holding the wicks and pouring in the oil. By the 3rd century CE, they closed in the lamps (now made on a potter's wheel) so the opening was merely a filling hole (Figure 157); by the 2nd century, manufacturing had turned to use of moldings and simple decoration was common. Romans lamps significantly differed in that they were depressed on the top around the fill-hole to a concave form, were fancier in decorative design, and generally had inscriptions of dedications or trade-marks (Figure 158). Although metallic lamps go back to the 4th millennium BCE, they were most common in the Roman period beginning in the 1st century CE (Figure 159). Frequently

metal lamps were made with more than one burner as in Figure 160. Extant forms have been found with as many as 14 burners (Robins, 1939).

Figure 157. Greek pottery lamp with



Figure 158. RomanFigure 159. Roman bronzepottery lamp withlampconcave decorated top

Figure 160. Roman dual spout lamp





Sometimes called "wick channel " lamps, these more advanced modifications were handcarried (Figure 161), suspended by chains hung from a spike in the wall (Figure 162) or the ceiling (Figure 163), placed in a niche in wall (Figure 164), or rested on a "candelabrum" or lampstand (Figure 165). Classical bronze lamps were known for multiple lights and more common in Roman households than earthen ones. Put on stands or hung, these gave more light for reading and writing albeit rather meager (as compared to today's standards) when suspended high in the middle of a large room as in Figure 166.

Figure 161. Hand-held metal wick channel lamp



Figure 162. Catacomb spike hanging wall lamp





Figure 164. Wall niche oil lamp



Figure 165. Roman lampstand



Figure 166. Scholar in his study lit by multi-burner metal oil lamp

Figure 163. Ceiling oil

lamp

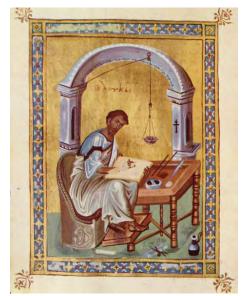


Floating-wick lamps. Associated with the early Christian and medieval eras, floating-wick lamps are distinguished by (a) oil poured over the surface of water, (b) bowl, bell, funnel-like or cone-shaped glass form, and (c) wick suspended in the middle of the container without any spout or nozzle on the side to hold it. Originating in Egypt, these float primitive lamps spread through the Byzantine culture; and

Figure 167. Glass floating-wick oil lamp, 4th century CE



Figure 168. *St. Luke* illuminated by an adjustable float lamp as he writes



migrated westward, for the most part, perpetuated by the Jewish, Christian and Islamic ecclesiastical communities as "sanctuary" lighting (Robins, 1939).

The simplest forms of single glass vases with either pointed or flattened bases (Figure 167) are pictured in early manuscripts hanging above Biblical or medieval authors (i.e., various saints or real-life portraits of famous clerics) who are often surrounded with writing artifacts. Figure 168 is a gospel frontispiece illumination of Saint Luke (mid-10th century) in the *Constantinople New Testament* showing this type of open flame lamp in use.

Notice the ingenious pulley installed to raise and

lower the lamp for more direct light for writing.

By the early 6th century CE, float lamps were adapted into hanging chandeliers by inserting them in suspended disks in Islamic, Jewish and Christian churches, thus, providing light for religious ceremonies and reading "The Book," often the heart of the services. Rows of these sanctuary vase lights suspended by chains can be seen in early Jewish miniatures such as Figure 169 from the *Sister Haggadah* (1350). A Hazzan is reciting orally the Haggadah from his raised pulpit (bimah). In addition to reading aloud to the illiterate congregation, the cantor also was responsible for attending the synagogue lamps. Figure 169. A Hazzan in a Spanish Synagogue with hanging float-wick oil lamps lighting the ceremony



Figure 170. Monks chanting by the light of 3 lamps



The Windmill Psalter (1280-1300) provides a good example of Christian liturgical chanting lit by funnelshaped float lamps hung from the ceiling (Figure 170). Four tonsured clerics share an open manuscript with musical notation on a lectern with a fish-shaped stem. The scene, like others we have seen before (Figures 70-71), shows a typical medieval small group shared reading event. The three lamps are so small, however, that they seem purely decorative and could hardly have produced enough candlepower by which to read.

Georges de De la Tour (1593-1652), another exceptional master of light and darkness, painted *Magdalene of the Smoking Flame* (1640) picturing the floating-wick lamp with excruciating and realistic detail. The brightly burning wick with water and oil in a clear glass container (Figure 171 and detail) exquisitely illuminates the books, vanitas skull, body and clothing of Mary. The glass container bears a striking resemblance to lamps pictured in a Egyptian hieroglyph found at the Rocks Tombs of El Amarna (Robins, 1939, p. 45) as drawn in Figure 172.







Figure 172. Egyptian hieroglyph of floatingwick oil lamp (1353 BCE)

Hence, the story of lighting in the dark ages and early medieval times is one of regression. For instance, in England and Normandy, torches were the mainstay supplemented with the crude earthenware open lamp types with no spouts such as the

floating-wick design above—far inferior to the closed lamps of the Romans. In fact, the square cresset-stone lamp (Figure 173), an even more primitive form popular in the British Isles until the close of the Middle Ages was "little removed from the hollowed stones of prehistoric lamp-makers" (Robins, 1939, p. 88).²³

Crusie Lamps and Variations. With the addition of a wick support, early iron "Crusie" lamps were a slight improvement over ancient open lamps such as the cresset

Figure 173. Primitive cresset-stone lamp with four cups from Bindon Abbey, England



stone—but not much. With origins in northern Europe and popular from the 16-17th

centuries in the West, plebeian crusie lamps burn most animal fats (tallow) giving a strong odor and are distinguished by a pear-shaped or ovoid open bowl to hold the oil attached to an arm with a hook and spike, which allowed them to be hung from a ceiling or suspended from a wall (Figure 174). Found throughout Europe (except for England), most had a second bowl beneath the first to catch the unused oil. In America these "double crusies" were known as "Phoebe" lamps (Figure 175). German speaking countries tended to favor the single "pan lamp" without a drip-catcher; and with that influence, enclosed one-pan American forms with lids evolved in Colonial times called "Betty" lamps (Figure 176). A wick holder was created in the base of the lamp and the cover meant less smoke and better light. (Boyle, 2002; Old Time Lamp Shop, 2007; Robins, 1939)



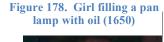
Figure 175. Phoebe Lamp with double pan

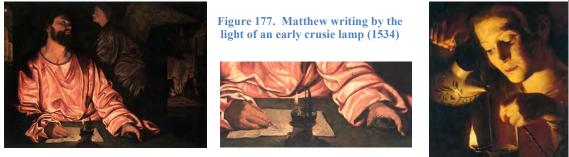


Figure 176. Betty Lamp with lid



Instances of early European Crusie pan lamps are represented in several realistic nocturnal 16-17th century paintings (Figures 177 with detail and 178).





Italian Giovanni Girolamo Savoldo's (1480-1548) specialty was night scenes and unusual effects of light and reflections. In Figure 177, the angel shrouded in almost complete shadow is offering inspiration to Matthew as the glow of the lamp shows him in the act of writing with pen in one hand and inkwell in the other. The lamp makes the paper radiate and the line of text luminous. Flames and sparks throw up more light on the right where three men gather round a fire.

French painter Trophime Bigot (1579-1650) was known as the "Candlelight Master" with his entire oeuvre consisting of nocturnal scenes of candles, torches and lamps with strong-shadowed but subtle chiaroscuro much like La Tour (Figures 77, 78, and 171). In

Figure 178, the intensity with which the woman is attending to the oil suggests the dangers involved by pouring fuel into the Crusie lamp while the wick is aflame.

Candles.

The candle was a comparative late-comer to illumination of which the earliest positive evidence dates only to the 1st century CE. (O'Dea, 1958, p. 18)

After the lamp came the candle. Historically, it had a very different path of development than the lamp, evolving instead as a child of the torch, the splinter and rushlights.²⁴ Although, for the most part, torches are wickless, the distinction between candle and torch is often blurred. In fact, the two sometimes look so similar in early paintings that one is hard pressed to tell the difference as with the flaming taper held by the rabbi as he instructs his students in a miniature from the *Sarajevo Haggadad* (c. 1350) (Figure 179).

The Romans were thought to have developed the wick candle made from beeswax, although we know from Pliny the Younger's writing that they had tallow candles too (O'Dea, 1958). "Most early Western cultures relied primarily on candles rendered from animal fat (tallow)" (History of Candles, 2010). If extant paintings are any judge, candles was the dominant source of illumination for literate activities over oil lamps through the Middle Ages and Renaissance.

Figure 179. Rabbi Gamallel and students from the *Sarajevo Haggadah*



Ironically, candles were much more labor intensive to make and maintain than oil lamps. In addition to the low uneven burn and flickering light, reading and writing were interrupted regularly to attend to the candle. One had to snuff them (trimming the burned wick off) every 10 minutes and also watch for guttering (loose molten wax that accumulates around the wick). If not, the light would be diminished to about a quarter of intensity—snuffing and guttering is messy, but also tricky, because one could easily put out the candle. A draft could easily blow out a candle and if it was doused improperly, the candle would give off smoke and an acrid stench (Brox, 2010, p. 14).

The next section explores several sub-themes of candles and literacy in paintings: (a) ecclesiastical, (b) symbolic vanitas, and (c) domestic motifs.

Religious Literacy.

The spirit of man is the candle of the Lord.

(Proverbs 20:27)

Candles had two functions in religious communities: symbolic/ceremonial and pragmatic. The candle stood for the light of faith and was/is an integral artifact of all religious ceremonies in the three major Western religions (Moslem, Jewish and Christian). Moreover, candles were critical for seeing to read and write in these services and other church-related activities.

<image>

Figure 180. Sabas reading aloud

In the Christian church, beeswax candles were used in church propers for altar use and exalted ceremonies/special occasions, while tallow ones (from carefully saved kitchen fats) light scriptoriums and common areas of the monastaries and grounds. While tallow candles were smoky and pungent, beeswax was much better in giving a fragrant, clear and steady burn. However, as a luxury item, beeswax candles were "rare and costly, being the province of only churches and the wealthy" (Brox, 2010, p. 11), costing four times as much as tallow candles (Bryson, 2010, p. 116). Since the wax came from bees, monasteries had special monks that tended bees and provided wax for Holy Day celebrations and masses (Mitchell, 1969). Since the ancients, bees have been regarded as divine (O'Dea, 1958).

An old 12th century miniature pictures a wonderful example of a long thin beeswax taper being used specifically to illuminate the reading of a manuscript. Holding the candle in one hand to light the page, the Monk Sabas reads aloud to the Emperor seated on his

throne (Figure 180). The large book with bold letters rests on a lectern. This painting is particularly remarkable because it depicts the aging monk relying on over-sized script to enable him to read smoothly without stumbling or hesitation. As mentioned earlier, works to be read publically demanded a larger format, consequently accommodating for both poor eyesight and dim light.

The next four paintings show both ceremonial and pragmatic uses of candles. A common Roman Catholic motif in illuminated manuscripts miniatures is the burial mass called the "Office of the Dead." The scenes were generally teeming with beeswax candles in as

Figure 181. Candlelit Office of the Dead: Vespers



much as their wicks were "symbolically linked with the soul" (O'Dea, 1958, p. 142). In an evening vesper example from the 15th century *Umfray Hours* (Figure 181), seven tapers in footed candlesticks surround the casket, two large candles stand on the altar and a tonsured monk holds a larger Paschal candle. Together the candles illuminate the multiple books being read at this Requiem Mass, literacy being at the heart of the funeral scene.

And thou shalt make a candlestick of pure gold: ...and though shalt make the seven lamps thereof; and thou shalt light the lamps thereof, that they may give light over against it..." Exodus 25:31

As an injunction in the Old Testament, the original Hebrew seven-branched candlestick was actually not a candlestick at all, but instead a group of floatwick lamps. Figure 182 is curious because above Joseph is a hanging Hanukkah lamp (menorah), although it is hard to tell if it contains candles or open flame lamps. Both a flaming taper and a torch on the wall light the high priest's book. In this presentation scene, Mary and Joseph are bringing the infant Jesus to the Temple in Jerusalem to "be consecrated to the Lord" (Luke 2:22-39). The caged doves in the left foreground allude to the theme of purification (Hall, 1974).

Figure 183 shows the lighting of the menorah candles that illuminate the open Talmud below on the table, spectacles belonging to the old cleric

Figure 182. Example of Jewish Menorah, torch and candle lighting in a Jewish synagogue



resting on the open seam. A portrait of Moses with the Ten Commandments hangs on the wall to the right. The Jewish Festival of Lights dates back to 165 BCE when the Jews

were victorious against the Hellenist Syrians and is

celebrated for eight days in November and December.

Figure 183. Jewish cleric celebrating the Jewish Festival of Lights



In Islam, mosque candles (and oil float lamps) indicated the presence of the divine, wisdom and truth that lightens the darkness. Figure 184 depicts Nawab of Oudh (a famous Sunni Muslim religious scholar) reading aloud at

night during the Muharram Festival in Lucknow,

Figure 184. Maulvi reading loud



India. Candle sconces ring the room and a large flaming chandelier lights the *maulvi* below as he reads the scriptures to the attending worshipers.

Vanitas Still Life. As medieval illuminated manuscripts suggest, candles in paintings were initially tied to rituals and church narratives from the early Judeo-

Christian times through the 1500s. The early 16^{th} century brought a new type of candlelight painting, the vanitas or skull motif.

Serving as a transitional genre with reoccurring iconographic components of candle, writing materials, inscriptions and books, these works bridged the divide between the religious and nonreligious with a complicated mixture of the church spiritual messages about one's mortality and a reaction against the wealthy by the intelligentsia and merchant classes. Two vanitas forms evolved at the end of the first quarter of the 16th century: (a) *Jerome in his Study* portraits (seen earlier in Side Bar 8 and Figures 76-79) containing only several vanitas elements, and (b) still life vanitas depictions (divorced from figures) of solely inanimate objects (see Side Bar 15), including candles and literary artifacts.

One of the earliest examples of the latter (Figure 185) is by Bruyn the Elder (1493-1555). On the back of a portrait of Jane-Loyse Tissier, "the detached jaw suggests the dissolutions of the



personality, the snuffed-out candle the extinction of life, the fly—symbolic of the devil...." (Ebert-Schifferer, 1999, p. 31). A note in the right hand corner says in Latin that "Everything decays with death/death is the final boundary of all things" (Schneider, 1999, p. 77).

Vanitas Candles

He who thinks of death can easily scorn all things.

(By Hieronymus in *Epistolae* [53, 11, 3] as cited in Schneider, 1999, p. 77)

In the 1500s a form of still life emerged called *Vanitas* (Latin for vanity) or *memento mori* flourishing particularly in Holland in the 17th century. Generally, the genre referred to a collection of objects that stood for the brevity of life and transience of earthly pleasures.

While the lit candle in paintings meant the flame of life, the barely flickering, and of course, the extinguished candle, were metaphors for death or that time is running out. For instance, in the earlier mentioned Death of Mary motif (Figures 70-71), the dying (or dead) Virgin often holds either a waning or extinguished candle. In Jerome study themes (Figure 76), the snuffed candle and the accompanying spectacles signified old age, failing eyesight and impending demise. Books and notes/inscriptions accompanied by the candle signify transience of human knowledge and vanity of scholarship, and the ephemeral nature of thoughts on paper.

Side Bar 15

Nonreligious/Domestic Literacy. As for lay activities of reading and writing at night at home and work in this early period of open flame technology, the vast majority of the Western population depended on "tallow candles" as the chief source of light up until the 1860s when better paraffin candles were produced. Even the best-read people used tallows sparingly because of cost and availability issues.

Reading and writing had to be difficult because a single "good" candle could barely penetrate the darkness, giving only 1/100th of the illumination of a 100 watt-bulb. As

noted earlier (see Side Bar 1), vision problems of hyperopia, myopia and presbyopia are exacerbated at night when eyes are tired and by dim or poor light; and candlelight barely shed enough light to see small print. Bryson (2010) astutely points out, opening our refrigerator door "summons forth more light than the total amount enjoyed by most households.... [from antiquity until the late 19th century]. The world at night for much of history was a very dark place indeed" (p. 12).²⁵

Paintings began capturing this idea of dim candlelight in a wide range of non-religious and domestic literacy settings and events— but not until the 17th century. A survey of the corpus of nocturnal candlelight portraits of the next two centuries show a broad range of purposeful secular activities (Figures 186-195). Lay men (and a few women) were pictured reading/writing for educational, scholarly, professional, communicative, informational, and recreational reasons. Earlier paintings presented here (Figures 37, *Night School and* Figure 38, *The Literary Club*) are good exemplars of early childhood education and group erudite pursuits by candlelight.

Of all of the works, the first two examples below give you the most dramatic and realistic sense of how it was to read and write, lost in a vaste pit of shadow and inky black with one single burning flame (Figures 186-187)—this is the way it was for centuries before any significant advances were made in man-made lighting technology.

Why did people read and write by candlelight?

1. For budding academic study and deeper, continuing scholarship of the lettered; (Figures 186-187);

Figure 186. *Student at a Table by Candlelight* by Rembrandt



Figure 187. *A Philosopher Writing* by Israels



2. For purposeful professional and working life or recreation and enjoyment; (Figures 188-189);

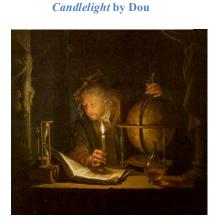


Figure 188. The Astronomer by

Figure 189. *The Duet* by van Honthorst



3. For knowledge of what is already written or for imparting new knowledge (Figures 190-191) (note juxtaposition of young and aging vision);

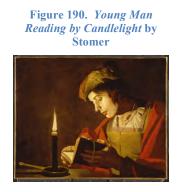


Figure 191. Old Man [with Glasses] Writing by Candlelight by Terbrugghen



4. For private or group correspondence (Figures 192-193); and

Figure 192. Portrait of a [myopic?] Man by Candlelight by unknown artist of the French School



Figure 193. Girl Reading a Letter with Old Man Reading over her Shoulder by Wright of Derby



5. For public or personal news and information (Figures 194-195).

Figure 194. Reading the News by Culvershouse



Figure 195. *The Politician* reading a newspaper



Enhanced Flame Period (1780-1880)

Evidence suggests that literacy was clearly a catalyst for rapid advances in lighting enhancement in the century from 1780-1889 (Perry, 1969; Robins, 1939). Rising literacy rates, demand for better light to read by, and wider range of availability of reading materials encouraged the first big surge of advances in lighting technology since ancient times. Three more efficient lamp fuels and central draft chimney technology lead the list.

Fuel Advances. Lamps and candles depended on vegetable or animal fat from their inception. Advances in types of fuel in the enhanced flame period (1780-1880) drove innovations in lamp technology and were critical in the transformation from ancient to modern lighting sources.

Whale Oil. The blubber of various whale species became a new source of illumination from the late 1700s until the 1860s when the whale population was devastated. The first oil to achieve commercial value, whale tallow was cheap and in demand in it's hey-day because it burned brighter than other animal tallow (Figure 196). However, whale oil still smelled terrible, although not as bad as lard. The affluent used premium sperm oil with a better odor—some \$200 per gallon in today's currency. Figure 196. Harpooning a whale (c. 1814)



Natural Gas. Leading innovation in the early 19th century was the first fuel without a wick, *gas.* Initially a byproduct of coal, gas's first application was in the UK at factories, shops and institutions that found candles prohibitive because of the expense and tending involved. The next major application of gas was for street lighting. Gas was especially popular in England and the United States with major American cities like Philadelphia, New York and Baltimore having gas works and streetlights by the 1830s (Brox, 2010, p. 60). Gas was not available for domestic use and did not become common

in homes until the 1850s (Bryson, p. 123). Because gas took special burners, and more importantly, a distribution and installation system, the innovation took almost a century to spread.

Kerosene. Also developed in the early decades of the 19th century, *kerosene* was another important fuel of illumination and cheaper than natural gas. Whales might have become extinct if it had not been for a series of events starting in Nova Scotia in 1846 that lead to the development of one of the most contentious and sought after products in the entire world. Abraham Gesner, a physician, invented a way to distill a combustible liquid he named *kerosene* that burned as clear, clean and bright as whale oil, and did not spoil over time (Bryson, 2010). His first source was from coal, the reason why some people called kerosene "coal oil." ²⁶ When Edwin Drake found petroleum in Titusville, PA in 1859, "the immediate demand for kerosene [a by-product of the refining process] ushered in the age of oil" (Brox, 2010, p. 83) and "the beginning of the 'Kerosene Era' in which the slogan 'a lamp in every room' was realized (Miller & Solverson, 1992, p. 8).

The one big advantage over gas (and later electricity) was that kerosene fuel was far less costly to distribute. As a result kerosene oil became widely used by the 1860s. Safe, cheap, and abundant, the fuel was available to the general public and rivaled gas through the turn of the next century as the most popular source of reading and domestic lumination in millions of homes, particularly in small towns and rural areas.

Candle Advances. In the first major change in thousands of years, tallow candles were improved with the introduction of wax from the cavities of sperm whales in the late 18th century. In 1751, Benjamin Franklin wrote to Susanna Wright exclaiming the virtues of the whale tallow candle.

When I had the Pleasure of seeing you, I mention'd a new [kind of Candle very convenient] to read by, which I think you said you had not seen: I take the

Freedom to send you a Specimen of them. You will find that they afford a clear white Light; may be held in the Hand, even in hot Weather, without softning (sic); that their Drops do not make Grease Spots like those from common Candles; that they last much longer, and need little or no Snuffing. (Franklin Papers, 1751)

New style table lamps were designed for multiple spermaceti wax candles such as the brass *Bouillotte Table Lamp*. Named for the French card game popular at the end of the 18th century, the lamp was fashioned to hold the game chips and prevent glare from the multiple candles as they burned down. With 2-4 candleholders and a metal shade, the top was a screw that allows one to move the shade down on a central shaft as the candles melted. As Figure 197. French Bouillotte lamp



shown in Figure 197, the Bouillotte was advantageous for literary pursuits as well as recreational.

Oil Lamp Advances. Although candles were a major source of domestic lumination from 1780-1880, oil lamps were close in popularity, especially in America with the thriving whaling business. The first basic change in ancient oil lamps after literally millenniums and the "real starting-point for rapid progress in the development of lighting appliances" (Robins, 1939, p. 109) was the invention of the Argand Oil Burner patented in 1780 in England by Aimé Argand (Figure 198). Only used by the more affluent, the lamp consumed considerably more fuel (first Figure 198. Argand vegetable oil and then whale oil) and was made from bronze,

Figure 199. Dr. Leroy writing by a French Quinquet Lamp



silver, crystal, or other expensive materials. However, it literally increased the lighting power higher than ever before, producing the light equivalent to 6-10 candles because of a central chimney that increased the draft (thus oxygen) and a new kind of wick, that together with the better air flow, required less frequent snuffing. Another advantage was the arm that allowed closer

central glass chimney lamp with circular wick



positioning of the light over the reading or writing materials as in Figure 199. To top that, the lamp was smokeless!

Figure 199 depicts Dr. Leroy (probably the obstetrician of the artist's wife) leaning on a volume of Hippocrates' Morbi mulierum (The Diseases of Women) and writing under the light of the French version of the central burner called a *Quinquet*. Although given credit for the addition of the enclosed glass chimney (Robins, 1939), supposedly Antoine-Arnoult Quinquet (1745-1803), a pharmacist in Paris, copied the invention from his friend Argand and wrongfully claimed it in France under his name.

Figure 200 shows the Argand Table Lamp with a green transparent shade. Ironic as it sounds, the central burner fueled with whale oil gave too much light and required screening, too bright for most reader's eyes. "After so many centuries of dreaming of more light, people [had to] shield the flame.... These were the first lampshades" (Brox, 2010, p, 54).

Brilliance, however, came at a high price most could not afford. The increasing cost of refined sperm oil (\$200 a gallon in today's money) led to the use of the common man's grease or lard oil lamp, a version of the central burner with an upright wick. Popular from 1820-1850s, especially in America, they were commonly made of tin, pewter or bras and had cylinder forms on stems like candlesticks as seen in John Fredrick Peto's (1854-

Figure 200. *The Elegant* **Reader** with an Argand lamp



1907) still life representation in Figure 201. The match lying on the table beside it was another significant invention of the time period affecting literacy activities (see Side Bar 16).

On a literary note, Noah Webster (Figure 202) complied his two-volume *American Dictionary of the English Language* published in 1828, by the light of two tin lard oil lamps with a font that tilted to keep the wick in the oil and a corrugated metal reflector to increase the light (Clute, 1941). Figure 203 is a photo of one of these lamps.

Figure 201. Still Life with Book, Pipe, Lard Lamp and Match



Figure 202. Noah Webster



Figure 203. One of Webster's tin lard lamps with reflector



Gaslight Advances. Gaslight was the first reading light "without a wick. " How many people actually read/wrote by oil lamps vs. gaslight is difficult to tell for gaslight's initial history and development was one of commercial and public use rather than personal and domestic.

Figure 204. William Murdoch



The ""Father of Gaslight" was William Murdock (1754-1839), a Scottish engineer and inventor (Figure 204), who is credited with lighting the first domestic residence. He piped in natural gas to his own home in Redruth, Cornwall in 1792. Available domestically by the mid-

1800s, illumination by gas was more of a middle-class phenomenon, as the poor could not afford gas and "the rich tended to distain it" (Bryson, 2010, p. 123-24).

Lighting the Light

Many do not realize how recent an invention matches are in the scheme of human development. The safety match was not invented until the late 1800s.

Before that there were only a few ways to light an oil lamp or candle—sparks from (a) striking flint against iron (tinderboxes), (b) friction between hard or soft wood (firesticks); (c) burning magnifiers, or (d) a borrowed existing flame or coal.

James Boswell (1740-1795) in 1791 wrote that at 2:00 in the morning he inadvertently snuffed his candle while writing. He couldn't find a tinderbox, the firelight had gone cold and he finally had to depend on a watchman from the street to "relune" without danger about 3:00 AM.

Side Bar 16

In addition to the infrastructure needed to get gas in homes and business, there were a number of drawbacks to gaslight: headaches, nausea, blackened ceilings, greasy soot, discolored fabrics, and most of all, danger of explosion. Another disadvantage was that gas fixtures were not moveable, so readers or writers were restricted as to where they could work at night—a kerosene lamp was portable.

The wonderful thing about gas lighting, however, was that it was exceedingly brilliant, as much as 20 times brighter than any other luminate. As Bryson (2010) suggests,

...It [gas] provided wonderful overall illumination, making reading, card playing and even conversation most agreeable.... Book titles became discernible on their

shelves. People read more. It is no coincidence that the mid-19th century saw a sudden and lasting boom in newspapers, magazines, books and sheet music. The number of newspapers and periodicals in Britain leaped from fewer than 150 at the start of the century to almost 5,000 at the end of it. (p. 123)

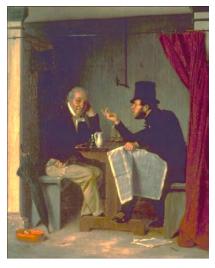
Figures 205-206 depict the public and commercial nature of 19th century gas

Figure 205. Scripture Reader in a Night Refuge (Poor House).



lighting and public institutional reading done by it. The first is an engraving of a nocturnal oral reading of scriptures in a poor house and the second is a painting by Richard Carlton Woodville (1825-1855) showing gas piping snaking along the upper wall of an eating establishment. The arm going down the wall to the table connects to an unadorned flat flame burner. By the late 1800s, Murdock's invention saw its way into

Figure 206. *Politics in an Oyster House* (with gas lighting fixtures)



more affluent homes for domestic use as shown in Figures 207-208.

In the 1879 etching (Figure 207), Mary Cassatt (1844-1926) evoked the tranquility of domestic life using her mother and sister, Lydia, as models. One woman is reading, the other mending, both sharing the bright light of a table gas lamp—but, notably, not each other's space. Cassatt suffered eye disease that affected her painting, just as other famous artists mentioned earlier.²⁷

Figure 208 is a good example of artistic license and exaggerated lamp output. The widower with the gas lamplight unnaturally illuminating the whole room has stopped reading his newspaper to listen to his daughter sing. She sounds so much like her mother. The work

was exhibited with the lines from a Tennyson poem: "But O for the touch of a vanish'd hand/And the sound of a voice that is still" (see Tate Website, Figure 206 caption).

Figure 207. Under the Lamp by Cassatt



Figure 208. *Her Mother's Voice* by Sir William Orchardson (1888)



Modern Lamp and Candle Advances.

We dreamed of the [kerosene] lamp which gives luminous life to dark matter.... The lamp [of petroleum]makes light ascend from the depths of the earth. (Bachelard, 1988, p. 66)

In the quest for better illumination, neither gas nor the Argand burner achieved the universality of the last major advance of the enhanced flame period of 1780-1880. The advent of kerosene initiated a revolution in artificial lighting during the Victorian Era with a profound social effect. With the dawn of cheap petroleum, the general public (poor and rich alike) had a new cheap fuel for lamps and for candle making (paraffin) that superseded tallow from whales. The enduring draw and success of kerosene lamps was evident in the over 1600 patent applications for improvements filed through 1880 (O'dea, 1958).

The net result [of this lighting revolution] was a perfect oil lamp with a reservoir in the base of it, the fuel being fed to a circular or flat wick by capillary attraction and a draught-producing glass chimney to insure a clear, steady light. It was the

Figure 209. The Smolensk Newspaper by Chagall (1914)



to 19^{th} century what indirect electric lighting is [was] to the 20^{th} . (Clute, 1941)

Kerosene (called petroleum in Europe) lamps usually burned as brightly as 5-14 candles (Brox, 2010, p. 82). They came in all shapes, sizes and forms— parlor lamps, table lamps, hanging area lamps, student desk lamps, floor lamps and sconces— popular collector items today because of the beauty of their bases, oil containers, chimneys and shades.

Kerosene lamps pictured in paintings around the turn of the century suggest the lasting hold this artificial light source had over gas lighting (and electricity) into the 20th century for both public and private venues. In an example of a common public literacy practice, Marc Chagall (1887-1985) depicted a café scene in which two men are discussing a newspaper article. A copy of the Russian *Smolensk Herald Newspaper* is the centerpiece of this celebrated scene painting (Figure 209). Lit by a circle of flickering greenish light from a kerosene lamp, the paper's headlines read "Voina" or War. The men sharing the news react differently; the younger on the left looks worried and disbelieving, the older on the right looks pensive and thoughtful.

Figure 210. *Under the Light of the Lamp* by Bonnard



Domestically, although one could read and do close work by the gas flame without eyestrain, people were hesitant to embrace the technology, many opting to keep their kerosene lamps to illuminate nightly domestic activities instead of installing gas in their home. As pictured in this Pierre Bonnard (1867-1947) painting (Figure 210), a well of darkness and shadow engulf the family gathering. Yet with the shade forcing the light down, there is an intimacy and togetherness under that warm soft yellow glow.

Around the turn of the century, the somewhat romanticized kerosene lamp became a frequently painted artifact by avant-garde artists of the Pointillism, Nabis, and Cubism movements. Their works give us varied and at the same time, magnificent examples of these lamps and how they were used in literate activities.

The Student Lamp. One hundred years after its invention, the Argand burner was adapted by German Adolph Kleeman to use cheap and plentiful kerosene. Sold by the thousands to the general public in the Victorian Era, it was known in America as the *Student (or Study) Lamp* or in Europe as the *Reading Lamp* (Figure 211). Generally a table model, the Student Lamps were not intended for area lighting, but instead for a smaller intimate area. Indeed, crafted specifically for reading and writing activities, they

were uniquely designed to minimize shadows and push the light downward onto the page for studying. "Most were adjustable in both its vertical height and its horizontal swing" (Miller & Solverson, 1992, p. 1). (See Side Bar 17 for additional information.)

French pointillist Paul Signac (1863-1935) nicely pictured how the swing arm allowed the fuel reservoir to be out of the way so the page could go directly under the light for brighter

The Non-Explosive Lamp Company

One of the most popular American manufacturers of the Student Lamp was the Cleveland Company. Its well-known model was advertised as "The Best Study or Library Lamp in the World." The style could burn either gas or kerosene for as long as 9, 17 or 24 hours on one reservoir (Miller & Solverson, 1992, p. 22). With a name like "The Cleveland NON-EXPLOSIVE Lamp Company," who wouldn't want to buy a lamp from them?

Side Bar 17

reading or writing (Figure 212). In an unusual scene for the time, Figure 213 depicts a little girl multi-tasking— knitting and reading at the same time by the white light of her student lamp.



Figure 212. *Woman with Lamp* by Paul Signac (1890)

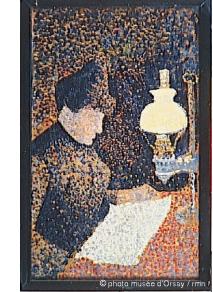


Figure 213. *Little Girl Reading and Knitting* by Ilsted



The Rochester Lamp. Around 1883, American Charles Stanford Upton (1844-1897) helped light up the life of literates by inventing the Rochester Lamp, yet another improvement of the 100+ year-old central draft technology. Upton was an avid reader and spent many evenings with a good book and newspaper. According to Shilling (1993), Upton was dissatisfied with the inadequate amount of light produced by the flat wick kerosene lamp and theorized that three or four wicks sewn together into a tube would give several times the light of the flat wick lamp. Teaming up with Leonard Henkle, a lamp maker, who patented the perforated thimble (a flame spreader), they invented the most popular and best-designed central draft lamp of the era (Figure 214). Revolutionizing the old kerosene

Figure 214. Rochester Lamp



lamp, "their amazingly successful venture brought artificial light to millions around the world for more than half a century" (Shilling, 1993). Advertised as the *Best Lamps on Earth* in 1885,²⁸ they survive today in the form of Coleman lanterns.

There are a number of paintings with the Rochester-like lamps around the turn of the century in which literacy is the focal point; Figure 215 being one particularly good example of a lone reader silently engrossed in a book, the glow from the oil table lamp illuminating the page surrounded in a shadowy night interior. The hanging kerosene lamp in Figure 216 provides wider area lighting for a family literacy scene that, among other reading practices, includes an oral reading lesson. Pablo Picasso, in one of his earliest works, portrays his friend, sculptor and author Joseph Cardona at his desk in an intimate writing scene illuminated by the kerosene's yellowish glow (Figure 217).

Figure 215. *By Lamplight* by Harriet Backer (1890)

Figure 216. *The Reading Lesson* by Ekvall (1912)

Figure 217. Portrait of Joseph Cardona by Picasso (1899)







In more contemporary renderings, the collages of complex configurations of Cubists Pablo Picasso (1881-1973) and Juan Gris (1887-1927) and Surrealist Joan Miro (1893-1983) speak to the universality and everyday use of the kerosene oil lamps in the early 1900s (Figures 218-220).

Figure 218. *Still Life with Skull, Book, and Oil Lamp* by Picasso

Figure 219. *Still Life* with an Oil Lamp by Juan Gris



Figure 220. *The Kerosene Lamp* by Joan Miro



Significantly, Brox (2010) christened kerosene lighting as "the last self-tended flame...the last open fire in the home " (p. 88-89).

I began the oil lamp's story thousands of years ago with stone artifacts and the juniper wick found deep in the caves of Lascaux and ended it in modern age with kerosene lamps, "the last open flame" of artificial lighting.

Ah, but the ancient oil lamp and its ancestors, the age-old servant of literacy and beacon of knowledge as Quint Buchholz's

Figure 221. *Book Lighthouse* by Buchholz



painting suggests (Figure 221), finally succumbed to a higher form.

Flameless Light Period (1880-present)

Fortunately, light without fire was our future. Nevertheless, in an attempt to stem the tide of the inevitable of flameless dominance, the Upton Rochester Lamp Company advertisement ran the following newspaper ad in the 1880s:

Electricity costs, one night, 60 Cents. 300 Candle [power] Rochester only costs, one night, 5 Cents (as cited in Shilling, 1993).

Never mind the cost difference, "electric lighting was ultimately irresistible. It was clean, steady, easy to maintain and available instantaneously in infinite amounts at the flick of a switch" (Bryson, 2010, p. 134).

The Early Years. Taming electric light, however, took several centuries of sporadic trial and error experiments. Albeit at a snail's pace when compared to the rate of advances today, readers/writers slowly transitioned through the early 20th century from dependence on the flicker of flames to the brilliance of the flameless incandescent light bulb. Just as with so many innovations, electric lighting started in the homes and businesses of the privileged and moneyed literates.

Benjamin Franklin (1706-1790) not only invented the bifocal, but also contributed mightily to the understanding of electricity with a corpus of written

works and experiments, one of which clarified that lightening and electrical charges were one and the same (Figure 222). His friend, artist Benjamin West (1738-1820), painted this posthumous portrait of him in 1816, portraying Franklin as a classical hero and

Figure 223. Craigside, Northumberland, UK: The first house to be wired with electricity



scientist discovering the lightening rod.

As to the actual invention, Sir Joseph Swan (1828-1914) was well ahead of Thomas Edison's (1847-1931) accomplishments. First introducing to the public his new electric incandescent light (albeit working only a few minutes) in Newcastle, England in 1879, Swan wired the world's first electrical home (as shown in Figure 223)—all before Thomas Edison (1847-1931) could accomplish anything of import in the field of electricity in America.

The owner of the first electrified house, Sir William

Figure 222. *Benjamin Franklin, Drawing Electricity from the Sky* (in an experiment of 1752)



Armstrong (1801-1900), a mechanical engineer and inventor, installed Swan's light bulbs at his home called Craigside (Northumberland) in 1880. A newspaper illustration during that time (Figure the 224) showed him reading at night below one lamp of eight that he had installed in the very first study to have electricity. He used the brook on his property to make the electricity!

Edison's "genius was organizing and producing electricity on a grand commercial scale" (O'Dea. 1958, p. 134) (Figure 225). I find it noteworthy that Edison first installed electricity in places that catered to very literate people and activities such as the New York Stock Exchange, the House of Commons in London and importantly, The New York Times building. In 1882, Times

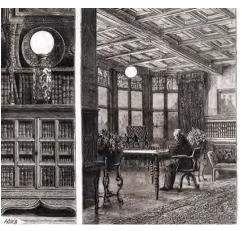
Figure 225. *Thomas Edison* in his laboratory



newspaper journalists came out unanimously in favor of electric over gas, saying that

It was a light that a man could sit down

Figure 224. Sir William Armstrong reading by an electric lamp in his study.



under and write for hours without the consciousness of having any artificial light about him.... The light was soft, mellow and grateful to the eye, and it seemed almost like writing by daylight to have a light without a particle of flicker and with scarcely any heat to make the headache. (as cited in Brox, 2010, pp. 122-123)

While the larger city populations had flameless lights early on, electricity only reached about 35 % of the American urban and suburban population by 1920. The last vestiges of oil lamps and candles did not disappear until the 1930s when President Franklin Roosevelt's New Deal made rural electrification a reality (Figure 226) (Brox, 2010).

Modern Times. Today, hardly a modern literate activity (day or night) transpires in which some sort of electric power does not play a part emailing, texting, e-book reading, word processing, publishing, even old fashioned book reading at night. The last vestiges of the old flame technology are the Coleman lanterns and candles, light sources for reading and writing for the most part relegated to outdoor camping and power outages (Figures 227-228).

Figure 226. Rural reading by electricity in the 1930s



Figure 227. Outdoor camping and open flame lighting



Figure 228. Last vestiges of flame technology



Yet, like eyeglasses, electric lighting technology and associated artifacts have become so ubiquitous and accepted they are invisible to us and to painters. Electric lights are rarely pictured or featured as important artifacts in paintings since mid-century. Figures 229-230 are two early 20th century examples by Picasso and Rockwell. As modern oil lamps before them, shaded table and student lamps with flexible long arms or goosenecks seem the standard for brighter reading and writing experiences (Figures 231-232) in contemporary times.





Figure 231. *Still Life with Lamp* by Roy Lichtenstein (1976)

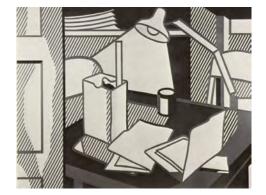


Figure 230. Detail from *And Daniel Boone Comes* to Life on the Underwood Portable by Rockwell (1923)



Figure 232. Poet Barry Yourgrau at his desk by Janet Fish (1982)

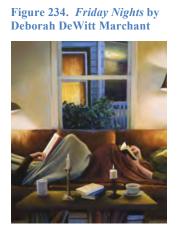


Yet contemporary readers still cling to lingering forms. The very artifacts of the ancients have had a huge renaissance in the 21st century. Fireplaces, oil lamps, and particularly candles are thriving businesses this century, not for reading and writing per se, but for decoration and mood setting.

Two paintings by Deborah DeWitt Marchant (b. 1956) characterize nicely our relatively newfound literacy relationship with candles, firelight and electricity (Figures 233-234).



Figure 233. *Evenings at Home* by Deborah DeWitt Marchant



Summary and Conclusions

This completes the *painted story* of lens and light and how each has extended the life of readers into the night and into old age. For those who were condemned to a distressingly blurry world; and, indeed, a painfully dim one after sunset (even *with* oil lamps and candlelight), these inventions were a godsend for better sight of the written word.

What does this survey of paintings and literacy history tell us about the relationship of *lens, light and literacy*?

Above all, it underscores how the technological development of vision aids and artificial lighting was *driven by literacy*. Major turning points in reading/writing history include the (a) the gradual evolution from an oral to a written culture and subsequent change from reading out loud in groups to silent reading alone; (b) the invention of the printing press; (c) the 'reading revolution' at the end of the 18th century; and (d) the "industrialization of the book and advent of mass literary culture" beginning in the 1830s (Lyons, 2010, p. 10). The last three were particular watersheds of progress for artificial lighting and eyewear. With the resulting surges in literacy rates and access to more reading materials and books came increasing demand for better ways to "see and produce text" and rapid advances in vision enhancement and lighting tools.

What a long, long road it was, however, to keen eyesight and illumination for readers and writers! Thousands of years brought agonizingly slow development

- 1. From the ancient's mirror, glass globe, and reading stone, to the handheld single reading lens, quizzer, and monocle, and finally to nose-, temple-, and ear-fitting eyeglasses; and
- 2. From antiquity's open flame of firelight, burning brand, oil lamp and candle, to whale, kerosene and gas burners, and at last to the flameless electric light.

Nevertheless, the evolution of both lens and light defied linearity. Pince-nez spectacles popular in the early 20th century were throwbacks to the original bridge nose glasses developed in the late 13th century. Roman oil lamps were more advanced than those used in the American colonies. The modern versions of the medieval handled magnifier and ancient domed reading stone are still in use today.

As institutions, Western religions, and especially the Catholic Church, were seminal in the development of eyewear, but did little to advance lighting technology. In fact ancient oil lamp and candle technology is still very much a part of ceremonial and ritualistic aspects of all three Western religions today, having very little to do with vision improvement.

Of course in most instances, the educated and the upper echelons of society benefited first, before the technologies of light and lens spread to the masses. Brox (2010) suggested, "As new forms of illumination [and vision aids] overtook the old, they competed with one another in ways that stratified society and intensified the separateness of countryside and city, household and industry" (p. 58)—including readers and non-readers.

While many vision and illumination challenges still remain in the 21st century,²⁸ eyeglasses, artificial lighting, as well as literacy, are technologies (at least in the West) that have moved to the realm of the common place, the ubiquitous, the socially and culturally invisible. Whereas lens, light, and literacy belonged to the "special" over the centuries after their invention, they now reside with the everyday and mundane. The rarity with which contemporary artists paint literacy artifacts of lens and light or for that matter, people just reading and writing, suggest how commonplace they are in the modern world, their uniqueness being clearly a story of the past.²⁹

In addition to a visual chronicle of the history of lens and light, what do the 200+ artistic works tell us about literacy practices?

A caveat is in order here. In paintings, we see *who* is using the written text and, to some extent, *how* they are interacting with them. We also get information about *what* is in the

picture and *when* and *where* the event took place, often suggested by the title, date and country of origin. However, the painting is a snapshot of a dynamic process frozen in time (a visual bite, so to speak) and we can only speculate as to the subtext (the implicit or metaphorical meaning).

Within these limitations and others (see footnote ³⁰), the artistic representations of lens and light across the centuries bring to life a broad array of clearly changing literacy practices. Through artists' eyes we glean varying purposes, domains, habits, participants; and values/beliefs—indeed, "situated literacies." I believe the reading and writing activities in the sample artistic works presented here represent a microcosm of the larger corpus of paintings that portray literacy and other associated artifacts (Figures 1-4).

Figure 235. *Rhetoricians at a Window* by Jan Steen (1662)



As to *why people read and wrote*, this historical survey suggests that religious devotional intent (Figure 73, 81), enlightenment (Figure 61) or Biblical scholarship (Figures 17, 18, 66, 147) were paramount, particularly from medieval times through the 17th century when more secular purposes abounded such as communication through letter writing (Figure 149), universal public education (Figure 138) and personal academic and professional pursuits (Figures 126, 148, 188). While we think of leisure reading as a modern phenomena, paintings actually showed reading for pleasure gained prominence in the Dutch genre movement of the 1600s with dramatic scenes of light and shade involving group amusements of merry-making, drink and music (Figure 189, 235).

As to *how people read and interacted with text*, the many art works bare out humankind's slow evolution from an oral to a silent print culture. Scenes of reading aloud in groups (Figures 61, 65, 74, 152, 194) were popular through the 19th century. (See Dowhower, 2006, for a survey of oral reading paintings). Although images of solitary figures lost in a book (Figures 140,148), particularly philosophers studying or monks meditating, appeared in the 1600s, it is often difficult to tell if they are reading aloud or to themselves. Not until the beginning of the 20th century can we infer from the images with some confidence that silent reading was the preferred modality (Figures 229 and 230).

As to *the actual readers/writers*, artists painted, for the most part, those who had "social, cultural and economic capital." Not surprisingly, men in general were the most advantaged and were pictured as the immediate recipients of the new inventions to improve sight of written text.

From the early Christian era, only male biblical characters and saints were shown reading and writing by artificial light—and even anachronistically with glasses from the late 1300s. By the latter part of the 11th century famous real-life clergy and aristocracy reading by the light of candles or lamps (such as Sabas and the Emperor in Figure 180) began appearing in manuscript illuminations; and of course by the mid 1300s, Tommaso painted his famous fresco with the first representation of spectacles on the nose of a monk that died 22 years before they were invented (Figure 62). Males were the first to be

Figure 236. Woman Examining a Coin by Lantern (1623)



pictured using single reading lenses (Figures 28-32), head and cap spectacles (Figure 82), quizzers and monocles, and purchasing double or single lenses at public vendors in the early 1500s (Figure 116).

If the number of paintings is any indication, women, for the most part, were disenfranchised from the reading/writing process and optical tools for centuries. As with spectacles (Figures 80, 81), there are no significant paintings of women (including saints) reading at night until first quarter of the 17th century; Gerrit van Honthorst's (1592-1656) superb rendering of an *Old Woman Examining a Coin by Lantern* (1623) being one of the first (Figure 236) and most significant since the picture has early representations of *both* bow wire spectacles and candlelight.

PAINTED LITERACY: LENS AND LIGHT

Artificial lighting associated with women reading became extremely popular at the end of the 19th century, a result of the wave of fascination with the female sex by artists who portrayed them in scores of paintings romantically enjoying books in softly lit domestic interludes (Figures 210, 212, and 215), as well as lush shaded outdoor scenes (Figure 144). As to eyewear, old prejudices have carried over from centuries of generally negative attitudes about bespeckled females. Females, even today, rarely are pictured wearing glasses in artistic works (as well as photographs) and when they are, the women are usually older (Figures 131,150).

Perhaps the most revealing, is tracing the threads of literacy practices through the venues *where people read and wrote* over the ages. The dynamic changes across settings suggested the ever-expanding nature of literacy from the advantaged to the masses, the religious to the secular, and public to domestic domains.

The first literacy setting depicting artificial light sources were the early medieval scriptoriums of the Evangelists (Figure 168) who composed at elaborate desks scattered with writing instruments. These scenes slowly transformed into the singular monastic cells of the late Middle Ages with mirrors and lenses (Figures 18, 29, 62) and the cluttered scholar's study of the Renaissance and Baroque periods (Figures 19, 164, 166, 199); finally morphing into the modern book-filled study filled of the 20th century (Figures 121, 122, 217) and the contemporary office of today (Figure 232).

Other than religious scriptorium scenes of reading and writing, those in actual churches were rare until the 1300s, first appearing in illuminated manuscripts (Figures 64, 65, 169, 181). The education of the clergy and the aristocracy at universities and church schools (Figure 179) was a particularly common scene in miniatures of this time, mirroring the rise of higher educational institutions in France, Italy and England. Dutch popularization of genre scenes of *peasant* schools in the mid-1600s showed literacy as an educational tool in the every daily life of the masses (Figure 138) for the first time.

The Flemish and Dutch art of the mid-1600s also was important in the initial depiction of literacy in domestic interiors (Figure 149), themes of which were later repeated in the idealized portraits of women and family life reading by the firelight, candle or lamp of the late 19th and early 20th centuries. Images of shared literacy in public eateries and cafés in the mid-to-late 19th century (Figures 51,194, 206 and 208) pointed to the rising distribution of alternative forms of information such as broadsheets, newspapers and magazines and underscored reading aloud as a secondary yet enduring modality (Dowhower, 2006).

Pope Gregory in the 6th century CE argued the didactic function of Christian narrative art saying that "the image was for simple men what the word is to those who can read." In 1025, the Synod of Arras supported this view decreeing, "illiterate men can contemplate in the lines of a picture what they cannot learn by means of the written word" (as cited in Kypiotis, 2010). Isn't it ironic that for literates in this day and age, "the lines" of paintings have important stories to tell about the history of literacy and its artifacts, ones that cannot be "learned" or gleaned altogether from the written word?

References

- Alan. (2008, January 24). Re: Fact: Not everyone can wear pince-nez. *Pince-Nez Renaissance* [Web log comment]. Retrieved from <u>http://pincenez1.blogspot.com/2008/01/fact-not-everyone-can-wear-pince-nez.html</u>
- Alan. (2010, April 6). Re: Who wore pince-nez? Pince-Nez Renaissance [Web log comment]. Retrieved from <u>http://pincenez1.blogspot.com/2010/04/who-wore-pince-nez.html</u> Also see

http://www.antiquespectacles.com/trade_cards/scarlett/scarlett.htm

- Ambrose, S. W. (1991). *Eisenhower: Soldier and president*. New York: Simon and Schuster.
- Andressen, B. M. (1998). Brillen: Vom gebrauchsartikel zum kultobjekt / Spectacles: From utility article to cult object. Stuttgart: Arnoldsche Verlagsanstalt.
- Ascaso, F. J. & Bosch, J. (2010). Uveitic seondary glaucama: influence in James Joyce's (1882-1941) last works. *Journal of Medical Biography*, 18, 57-60. doi: 10.1258/jmb.2009.009064
- Avrin, L. (1991). Scribes, script and books: The book arts from antiquity to the Renaissance. Chicago: Art Library Association; London: The British Library.
- Bachelard, G. (1988). *The flame of a candle* (J. Caldwell, Trans.). TX: Dallas Institute Publications.
- Baron, D. (1999). From pencils to pixels: The stages of literacy technology. In G. Hawisher and C. Selfe, (Eds.), *Passions, pedagogies and 21st century technologies* (pp. 15-33). Logan, UT: Utah State University Press.
- Barton, D., Hamilton, M., & Ivanic, R. (2000). *Situated literacies: Reading and writing in context*. New York: Routledge.
- Beckett, S. W. 1999). Sister Wendy's 1000 masterpieces. London: Dorling Kindersley.
- Beyer, A. (2003). *Portraits: A history* (S. Lindberg, Trans.). New York: Harry N. Abrams.
- Boehm, B. D. (1994). The books of Florentine illuminators. In *Painting and illumination in early Renaissance Florence 1300-1450* by Kanter, B., Boehm, B. D., Strehlke, C. B., Freuler, G, Thruman, C. C., & Palladino, P. New York: Metropolitan Museum of Art, Harry Abrams distributor.
- Boehm, M. (2006, December 16). 'Blinking Sam' to be in full view. *Los Angeles Times*. Retrieved from <u>http://articles.latimes.com/2006/dec/16/entertainment/et-blinking16</u>
- Borobia, M. (2011). Lorenzo Costa, The Bentivoglio Family, 1493, at the Museo Thyyssen-Bornemisza Museum, Madrid. Retrieved from <u>http://www.museothyssen.org/en/thyssen/ficha_obra/487</u>
- Boyle, B.M. (2002). *Early lighting 2 in America: Betty lamps and grease lamps*. Retrieved from Rams Horn Studio website: http://www.ramshornstudio.com/early lighting 2.htm
- Brands, H. W. (2005). Andrew Jackson: His life and times. New York: Doubleday.
- Brox, J. (2010). *Brilliant: The evolution of artificial light*. New York: Houghton Mifflin Harcourt.
- Bryson, B. (2010). At home: A short history of private life. New York: Doubleday.

PAINTED LITERACY: LENS AND LIGHT

- Budgen, F. (1934/1967). James Joyce and the making of Ulysses. Bloomington: Indiana University Press.
- Burckhardt, J. (1947). Rembrandt and Van Dyke: Zwei vorträge. Bern: A. Scherz.
- Chaplin, J. E. (2006). *The first scientific American: Benjamin Franklin and the pursuit of genius*. New York: Basic Books, Perseus Book Group.
- Clute, E. (1941, September). Flashback: lamps and illuminants. *American Collector Magazine*. Retrieved from <u>http://www.collectorsweekly.com/articles/lamps-and-illuminants/</u>
- College of Optometrists. (2011). *Rivet spectacles*. Retrieved from The MusEyeum Online Exhibition Spectacle Gallery, British Optical Association Musuem website: <u>http://www.college-optometrists.org/en/knowledge-</u> centre/museyeum/online_exhibitions/spectacles/rivet.cfm
- College of Optometrists. (2011a). *Everybody dies*. Retrieved from The MusEYEum On-line Exhibition Art Gallery, British Optical Association Musuem website: <u>http://www.college-optometrists.org/en/knowledge-</u> centre/museyeum/online_exhibitions/artgallery/memento.cfm
- College of Optometrists. (2011b). *A curtain fell on him*. Retrieved from The MusEYEum On-line Exhibition Art Gallery, British Optical Association Musuem website: <u>http://www.college-optometrists.org/en/knowledge-</u> <u>centre/museyeum/online_exhibitions/artgallery/reynolds.cfm</u>
- College of Optometrists. (2011c). *Antiques in use*. Retrieved from The MusEYEum On-line Exhibition Art Gallery, British Optical Association Musuem website: <u>http://www.college-optometrists.org/en/knowledge-</u> centre/museyeum/online_exhibitions/artgallery/antiques.cfm
- College of Optometrists. (2011d). *The 'inventor' of bifocals?* Retrieved from The MusEYEum On-line Exhibition Art Gallery, British Optical Association Musuem website: <u>http://www.college-optometrists.org/en/knowledge-</u> <u>centre/museyeum/online_exhibitions/artgallery/bifocals.cfm</u>
- Corson, R. (1967). Fashion in eyeglasses. Chester Springs, PA: Dufour.
- Crestin-Billet, F. (2004). Collectable eyeglasses (J. Sty, Trans.). Paris: Flammarion.
- Danielsson, B. (1966). Gauguin in the south seas. Garden City, NY: Doubleday.
- Davidson, D. C. & MacGregor, R. J. S. (2002). *Spectacles, lorgnettes and monocles*. Haverfordwest, Dyfed: Shire Publication, Ltd.
- Davies, D. & Elliott, J. H. (2003). *El Greco*. NY: Metropolitan Museum of Art; London: National Gallery.
- Daxecker, F. (1997). Representations of eyeglasses on Gothic winged altars in Austria. Documenta Opthalmolgica, Advances in Opthalmology, 93 (1-2), 169-188.
- De Beaune, S. A., & White, R. (1993). Ice age lamps. *Scientific American Monthly*, 266(3), 108-113.
- De Hamel, C. (1986). A history of illuminated manuscripts. Boston: David R. Godine.
- De Rynck, P. (Ed.) (2004). *How to read a painting: Lessons from the old masters*. New York: Harry N. Abrams.
- DiLaura, D. L. (2006). A history of light and lighting: in celebration of the century of the *Illuminating Engineering Society of North America*. New York: Illuminating Engineering Society of North America.

- Dowhower, S. L. (2006). Painted literacy: Reading aloud rituals. *American Reading Forum Yearbook*. Retrieved http://www.americanreadingforum.org/yearbook/yearbooks/06_yearbook/volume 06.htm#Dowhower
- Drewry, R. D. (2007). *History of glasses: What man devised that he might read*. Retrieved from Teagle Optometry Website: http://www.teagleoptometry.com/history.htm
- Ebert-Schifferer, S. (1999). Still life: A history. New York: Harry N. Abrams, Inc.
- Ellmann, R. (1982). James Joyce. Oxford: Oxford University Press.
- Enoch, J. M. (1998, April). Enigma of early lens use. *Technology and culture*, 39(2) 273-291. Enoch, J. M. (2007, May-June). Archeological optics: The very first known mirrors and lenses. *Journal of Modern Optics*, 54 (7-9), 1221-1239.
- Enoch, J. M. (2006). History of mirrors dating back 8000 years. *Optometry and Vision Science* 83(10), 775-781.
- Enoch, J. M. (2007, May-June). Archeological optics: The very first known mirrors and lenses. *Journal of Modern Optics*, 54(7-9), 1221-1239.
- Enoch, J. M. (2009). The fascinating early history of optics! Archaeological Optics 2009; our knowledge of the early history of lenses, mirrors and artificial eyes! Invited Paper [7428-02]. Proceedings-spie the international Society for Optical Engineering, 7428 742803 British Library Series. doi:10.1117/12.828453
- Eshleman, C. (2003). Juniper fuse: Upper Paleolithic imagination and construction of the underworld. Middletown, CT: Wesleyan University.
- Eyeglasses. (2011). *Thomas Jefferson Encyclopedia*. Retrieved from The Jefferson Monticello website: <u>http://www.monticello.org/site/research-and-</u>collections/eyeglasses#
- Fischer, S. R. (2003). A history of reading. London: Reaktion Books LTD.
- Fleishman, D. A. (2011). Antique Spectacles and Other Vision Aids. *The On-Line Museum and Encyclopedia of Vision Aids*. Retrieved from <u>http://www.antiquespectacles.com/</u>
- Fleishman, D. A. (2011a). *Rivet spectacles—the earliest styles*. Retrieved from the Antique Spectacles and Other Vision Aids website: http://www.antiquespectacles.com/rivet_spectacles/rivets.htm
- Fleishman, D. A. (2011b). *Kloster Wienhausen*. Retrieved from the Antique Spectacles and Other Vision Aids website: http://www.antiquespectacles.com/topics/wienhausen/3/spectacles.htm
- Fleishman, D. A. (2011c). *Eyeglasses through the ages*. Retrieved from the Antique Spectacles and Other Vision Aids website: http://www.antiquespectacles.com/history/ages/through_the_ages.htm
- Fleishman, D. A. (2011d). *Benjamin Martin and his visual glasses*. Retrieved from Antique Spectacles and Other Vision Aids website: http://www.antiquespectacles.com/topics/martin/martin.htm
- Fleishman, D. A. (2011e). *Benjamin Franklin—father of the bifocal*. Retrieved from Antique Spectacles and Other Vision Aids website: http://www.antiquespectacles.com/topics/franklin/franklin.htm
- Fleishman, D. A. (2011f). Scarlet focus mark at Antique Spectacles and Other Vision Aids. *The On-Line Museum and Encyclopedia of Vision Aids*. Photo retrieved from http://www.antiquespectacles.com/trade_cards/associated/associated.htm

PAINTED LITERACY: LENS AND LIGHT

For more information on focus marks.

- Franklin Papers. (1751, November, 21). Letter to Susanna Wright: Volume 4. Digital Edition of the Papers of Benjamin Franklin, American Philosophical Society and Yale University website: Retrieved from http://www.franklinpapers.org/franklin/framedVolumes.jsp
- Franklin Papers. (1771, July 17). Letter to Jane Franklin Mecom: Volume 18. Digital Edition of the Papers of Benjamin Franklin, American Philosophical Society and Yale Univerity website: Retrieved from http://www.franklinpapers.org/franklin/framedVolumes.jsp
- Franklin Papers. (1784, August 21). Letter to George Whatley: Volume 37, unpub. 1784-85. Digital Edition of the Papers of Benjamin Franklin, American Philosophical Society and Yale University website: Retrieved from http://www.franklinpapers.org/franklin/framedVolumes.jsp
- Franklin Papers. (1785, May 23). Letter to George Whatley: Volume 37, unpub. 1785-86. Digital Edition of the Papers of Benjamin Franklin, American Philosophical Society and Yale University website: Retrieved from <u>http://www.franklinpapers.org/franklin/framedVolumes.jsp</u>
- Frugoni, C. (2003). Books, banks, buttons. New York: Columbia University Press.
- Getty (2007). Radiant darkness: the art of nocturnal light. Past exhibition at the Getty Center, April 24-July 22, 2007. Retrieved from the J. Paul Getty Museum website: <u>http://www.getty.edu/art/exhibitions/radiant_darkness/</u>
- Gibbs, R. (1989). Tomaso da Modena: painting in Emilia and the march of Treviso, 1340-80. New York: Cambridge University Press.
- Gilbert, S. (Ed.). (1957). Letters of James Joyce. New York: Viking Press.
- Gowing, L. (Ed.) (1995). A history of art. New York: Barnes & Noble.

Gurewitsch, M. (2009, March). Jan Lievens: Out of Rembrandt's shadow. *Smithsonian Magazine* retrieved from <u>http://www.smithsonianmag.com/arts-culture/Out-of-Rembrandts-Shadow.html</u>

- Haas, C. (1996). *Writing technology: Studies on the materiality of literacy*. Mahwah, NJ: Lawrence Erlbaum Associates, Publishers.
- Hall, J. (1979). *Dictionary of subjects and symbols in art*. Oxford, England: Westview Press.
- Hamilton, R. (2000). Expanding the new literacy studies: Using photographs to explore literacy as a social practice. In D. Barton, M. Hamilton, & R. Ivanic (Eds.), *Situated literacies: Reading and writing in context* (pp. 16-33). New York: Routledge.
- Handy, M. P. (1876). Confederate make-shifts. In *Harper's Magazine: Making of America project: Vol. 52*, (pp. 576-580) [Google eBook]. Retrieved from <u>http://books.google.com/books?id=pOYvAAAAMAAJ&printsec=frontcover&so</u> <u>urce=gbs ge summary r&cad=0#v=onepage&q&f=false</u>
- Hapgood, H. (1900). *Abraham Lincoln: The man of the people*. New York: Macmillan Co.
- Hemingway, V. (2004). *Running with the bulls: My years with the Hemingways*. New York: Ballantine Books.
- Hern, C. (2004, June 1). *Quizzing glasses*. Retrieved from http://www.candicehern.com/collections/04/eyeglass.htm

- History of Candles. (2011). Retrieved from National Candle Association website: http://www.candles.org/about_history.html
- Holtmann, H. W. (1980). A short history of spectacles. In W. Poulet, *Atlas of the history* of spectacles (pp. vii- xxi) Bonn: Wayneborgh.
- Hough, W. (1902). *The development of illumination*. Washington DC: Government Printing Office and Rushlight Club.
- Hustvedt, S. (2005). *Mysteries of the rectangle: Essays on painting*. New York: Princeton Architectual Press.
- Hyman, L. (2007, July-August). Myopic and hyperopic refractive error in adults: an overview. *Ophthalmic Epidemiology*, 14(4), 192-197. doi: 10.1080/09286580701535517
- Ilardi, V. (2007). *Renaissance vision from spectacles to telescopes*. Philadelphia, PA: American Philosophical Society.
- Irving, W. (1854). *The works of Washington Irving*, Vol. XI. Oliver Goldsmith. New York: G. P. Putman.

Isaacson, W. (2003). *Benjamin Franklin: An American life*. New York: Simon & Schuster.

- Kaplan, R. M. (2008, August). Doctors, disease and James Joyce. *Austrialian Family Physician*, *37*(8), 668-9.
- Kelley, A. (1978). *Lenses, spectacles, eyeglasses and contacts: The story of vision aids.* New York: T. Nelson Publisher.
- Kellsey, C. M. (1999). Lecto divina: nuns and reading in the sixth and seventh centuries (Master's thesis). Retrieved from Jan Jose State University SJSU ScholarWorks: http://scholarworks.sjsu.edu/etd_theses/1934/
- Koster, B. (2010, May 27). Interview with Chuck Close. *F Newsmagazine*. Retrieved from <u>http://fnewsmagazine.com/wp/2010/05/interview-with-chuck-close/</u>
- Kypiotis, L. (2010, June). *To see...catalogue essay*. Retrieved from the Pilgrim Project website: <u>http://www.thepilgrimproject.org/?p=472</u>
- Lipson, N. (2008, February). One of mankind's greatest inventions. Mivision. Retrieved from www.antiquespectacles.com/newsworthy/pdf files/feb 2008 mivision.pdf
- Literacy Clubs in the US. (n.d.). Retrieved from the Indianapolis Literacy Club website: http://www.literaryclub.org/id18.html
- Livingstone, M. S. & Conway, B. R. (2004, September 16). Was Rembrandt stereoblind? *New England Journal of Medicine*, 351, pp. 1264-1265.

Louvre. (2003, October 1). Saint Jerome Meditating by Jan Cornelisz Vermeyen. <u>Retrieved from</u>

http://www.louvre.fr/llv/oeuvres/detail_actualite.jsp?CONTENT%3C%3Ecnt_id= 10134198673211764&CURRENT_LLV_FICHE%3C%3Ecnt_id=101341986732 11764&FOLDER%3C%3Efolder_id=9852723696500764&bmLocale=en

- Luckiesh, M. (1920). Artificial light. New York: The Century Co.
- Lyons, M. (2010). A history of reading and writing: In the western world. Houndmills, Bassingtoke, Hampshire; New York: Palgrave Macmillan.
- Macfarlane, A. & Martin, G. (2002). *Glass: a world history*. Chicago: University of Chicago Press.

Maddox, B. (1988). Nora: The real life of Molly Bloom. Boston: Houghton Mifflin.

Manguel, A. (1996). A history of reading. New York: Penguin Books.

- Marmor, M. F. & Ravin, K. G. (2009). *The artist's eyes: Vision and the history of art.* New York: Abrams.
- Meiss, M. (1970). *The great age of fresco: Discoveries, recoveries and survivals*. New York George Braziller in association with The Metropolitan Museum of Art.
- Mellby, J. L. (2008, November 12). Palatino's tools of handwriting. *Graphic Arts*, pp. 1-3. Online publication by Princeton University Library. Retrieved from <u>http://blogs.princeton.edu/graphicarts/2008/11/palatinos_tools_of_handwriting.ht</u> <u>ml</u>
- Meyers, J. (1985). Hemingway, a biography. New York: Harper & Row.
- Miller, R. C. & Solverson, J. F. (1992). *Student lamps of the Victorian era*. Marietta, Ohio: Antique Publications.
- Mitchell, R. (1969). *The study book of lamps and candles: The history of lighting*. London: Bodley Head.
- MusEYEum News 2 (2010, March 15). The man who wouldn't wear his spectacles. 1(2), 2. Retrieved on the College of Optometrists website: <u>http://www.college-optometrists.org/en/utilities/document-summary.cfm/docid/0FB0E4BE-3048-216E-80888678A3AC5591</u>
- O'Dea, W. T. (1958). The social history of lighting. London: Routledge and Paul.
- Old Time Lamp Shop. (2007). *Betty lamps*. Retrieved from http://collectlamps.com/fat%20betty%20lamps.html
- Orr, H. (1985). Illustrated history of early antique spectacles. Kent, UK: Beckenham.
- Page, David (2010, September 14). From Sea to Sea (March-September, 1889) by R. Kipling. Footnote, p. 446, line 15. Retrieved from http://www.kipling.org.uk/rg_seatosea_twentyone.htm
- Perry, D. H. (1969). *Out of darkness: A history of lighting*. Rochester, NY: Rochester Museum and Science Center.
- Pliny, the Elder (C. 77 CE). *The Natural History*, Book XXXVII, Chapter 10. Retrieved from

http://www.perseus.tufts.edu/hopper/text?doc=Perseus%3Atext%3A1999.02.0137 %3Abook%3D37%3Achapter%3D16

- Poulet, W. (1980). Atlas of the history of spectacles. Bonn: Wayneborgh.
- Robins, F. W. (1939). *The story of the lamp (and the candle)*. London: Oxford University Press.
- Rosen, E. (1956). The invention of eyeglasses. *Journal of the History of Medicine and Allied Science*, 11(1), 13-46; 182-218.
- Rosenthal, J. W. (1996). *Spectacles and other vision aides: A history and guide to collecting.* San Francisco: Norman Publishing.
- Sambrook, J. (2009, February). Club (act. 1764–1784). Oxford Dictionary of National Biography, Oxford University Press online edition. http://www.oxforddnb.com/public/themes/49/49211.html
- Saywell, D. & Simon, J. (2004). *Complete illustrated catalogue, National Portrait Gallery*. London: National Portrait Gallery.
- Schneider, N. (1999). *Still life: Still life painting in the early modern period*. New York: Taschen.
- Sellers, C. C. (1962). *Benjamin Franklin in portraiture*. New Haven: Yale University Press; American Philosophical Society.

- Sheehan, G. (2004, April 6). *Kipling and Medicine: Neurological Conditions, Kipling's eyesight problems*. Retrieved from http://www.kipling.org.uk/rg_kipmedicine_1.htm
- Shilling, D. A. (1993, December). How Rochester lamps helped light up the world. *The Crooked Lake Review*. Retrieved from

http://www.crookedlakereview.com/articles/67_100/69dec1993/69shilling.html

Smith, F. (1988). Joining the literacy club. Portsmouth, NH: Heinemann.

Spectacles and Sunglasses. (2005). Amsterdam: Pepin Press.

- Temple, R. (2000). The crystal sun: Rediscovering a lost technology of the ancient world. London: Century.
- Thomas Jefferson Papers. (1806, December 1). Letter and bill from John McAllister to Thomas Jefferson. Retrieved from Library of Congress website" http://hdl.loc.gov/loc.mss/mtj.mtjbib016628

Thomas Jefferson Papers. (1806, November 12). Letter from Thomas Jefferson to John McAllister. Retrieved from Library of Congress website: http://hdl.loc.gov/loc.mss/mtj.mtjbib015576

Thomas Jefferson Papers. (1808, November 16). Letter from Thomas Jefferson to John McAllister. Retrieved from Library of Congress website: http://hdl.loc.gov/loc.mss/mtj.mtjbib019310

- Thomas, J. (2000). Victorian narrative painting. London: Tate Publishing.
- Totty, M. (2010, September 28). A different kind of eyeglasses. *Wall Street Journal*. Retrieved from <u>http://nbsrocks.com/a-different-kind-of-eyeglasses</u>
- Tusting, K., Ivanic, R., & Wilson, A. (2000). New literacy studies at the interchange. In D. Barton, M. Hamilton & R. Ivanic (Eds.), *Situated literacies: Reading and writing in context* (pp. 210-218). New York: Routledge.
- University Archives. (2009). Pair of spectacles belonging to President Abrahm Lincoln (2009). Retrieved from the University Archives of Artifacts, Letters & Relics website: <u>http://www.universityarchives.com/Find-an-Item/Results-List/Item-Detail.aspx?ItemID=52763</u>
- V&A. (2011). Medieval monasteries. Drawing showing how the clositer of Battle Abbey [East Sussex, England] might have appeared in the 13th century, with the north cloister being used as a scriptorium. ©English Heritage Photo Library. Retrieved from the Victoria and Albert Museum website: http://www.vam.ac.uk/content/articles/m/medieval-monasteries/
- White, T. (2007, April 11). Eye diseases changed great painters' vision of their work later in their lives. *Stanford University News*. Retrieved from http://news.stanford.edu/news/2007/april11/med-optart-041107.html
- Willach, R. (2008). *The long route to the invention of the telescope*. Philadelphia: American Philosophical Society.
- Windsor Eyeglasses. (2011). Retrieved from the Eyeglassess Warehouse website: http://www.eyeglasseswarehouse.com/pages/windsor.html

Wongte. (2010, November 28). The remediation of the visual [Web log post]. Retrieved from ETEC540: Text Technologies website:

http://blogs.ubc.ca/etec540sept10/2010/11/28/the-remediation-of-the-visual/

Wood, G. S. (2004). Americanization of Benjamin Franklin. New York: Penguin Press.

PAINTED LITERACY: LENS AND LIGHT

World Lingo. (2010). *Mauritius Rotunda*. Original Wikipedia article in German. Translation retrieved at http://www.worldlingo.com/ma/dewiki/en/Mauritiusrotunde#Weblinks

Footnotes

²⁰ The phrase "radiant darkness" is from a small 2007 exhibition entitled *Radiant Darkness: The Art of Nocturnal Light* at the J. Paul Getty Museum in CA, featuring Gerrit Dou and other artists' special skill in chiaroscuro. See the Getty website overview http://www.getty.edu/art/exhibitions/radiant_darkness/

²¹ Artist Quint Buchholz was diagnosed when he was a child with a vision problem in which his eyes were poorly aligned (called "walleyed" or "stereo blind"). This condition causes the person to have no depth of vision and see everything flat. Thus, Buchholz as a painter, finds it easy to translate three dimensional impressions of reality into two dimensional images and turn an eye defect into an advantage (see http://www.quintbuchholz.de/en/articles/how-it-all-began.html

Livingstone & Conway (2004) believe Rembrandt was stereo blind just as Buchholz was. ²² See Lighting from the *Canadian Encyclopedia* website for a discussion of the three time periods in the evolution of lighting. Retrieved from <u>http://www.thecanadianencyclopedia.com/index.cfm?PgNm=TCE&Params=A1ARTA00</u>

04681

²³ A cresset stone was a flat stone (often square) with single or multiple cupshaped hollows. Multiple cups looked like an egg box. Most common to church or monastery sites in Great Britain, cressets were fill with oil or tallow with a floating wick to produce a primitive form of artificial light.

²⁴ Splinters were made of narrow splits of wood systematically cut and tied together. Made with resinous wood (especially pine) or sometimes treated with combustible material, they were in effect, skinny torches. Probably developed by the ancient Egyptians, *rushlights* were actually a miniature torch formed by dipping the peeled rush plant in fat or grease. We think of them as the first primitive candle.

²⁵ While I was finishing this paper, a storm knocked out our electric power for 24 hours. In a stroke of irony, I spent two hours at night editing a printed copy of the manuscript by candlelight. With my tired aging eyes, it took the light of five candles for me to decently see the text and even that caused me some eyestrain and a headache!

²⁶ In addition to "coal oil," kerosene was also referred to as "paraffin" by the British or just "petroleum" by others on the Continent.

²⁷ Like James, Monet and others, Cassatt was an artist who was devastated by failing vision and eye disease. In fact, her ocular problems forced her to stop painting in 1915 and by 1918 she could no longer read. Historians think that she painted exclusively in pastels at the end of her career because they allowed her to accommodate her vision loss with more fuzzy lines and fewer details, particularly in the facial representations (see Marmor & Kavin, 2009, pp. 160-163).

²⁸ The most current 21st century eyewear technology solution to poor vision is called *Superfocus* spectacles invented by Stephen Kurtin and produced by Superfocus, LLC out of California. These dual-lens glasses (which look amazingly like James Joyce's Empire Ovals) manually adjust for individual prescriptions for hyperopia, presbyopia,

myopia and/or astigmatism to "give clear undistorted vision whether reading a book, working on the computer or looking into the distance" (Totty, 2010). Superfocus eyewear has been awarded several prestigious industry awards, including the *Wall Street Journal 2010 Innovations Silver Award* and is being used by the astronauts on Discovery's final spaceflight (Spring, 2011) and aboard the International Space Station. Retrieved from <u>http://www.superfocus.com/superfocus-certified-by-nasa-for-astronauts</u>

²⁹ Compared to other eras, artists of the 20th century have produced few paintings representing either literacy or vision aids. With some exceptions, it is very difficult to find contemporary art works with people reading and writing, let alone wearing spectacles at the same time. Two possible reasons for this shift are (a) the decline of figurative art— the genre of representational painting was out of vogue for most of the era; and (b) the age of pervasive and cheap photography and digital technologies have virtually killed the once widespread middle or upper class portraiture painting (of real people) dating back to the Renaissance.

³⁰ However, as Hamilton (2000) suggests, "visible literacy events are just the tip of an iceberg: literacy practices can only be *inferred* from observable evidence because they include invisible resources, such as knowledge and feelings, they embody social purposes and values, and they are part of a constantly changing context, both spatial and temporal" (p. 18). Another caution has to do with the artists themselves. Painters crafted works with literacy at their center with biases, motives and expectations ruled by the era and society as a whole, and often patrons (who were paying them) in particular. Some literacy practices may well have been artificially constructed for show or public display. In addition, artists used conventions that were often exaggerated, unrealistic or just plain false (e.g., Jerome writing with eyeglasses or a reader with a book faced away from the firelight.) In a nutshell, all cannot be trusted in a painting!

Figures

Figure 1. Forms and Surfaces of Literacy Technologies. PowerPoint slide, American Reading Forum, December 10, 2010.

Figure 2. Writing Tools and Accessories. PowerPoint slide, American Reading Forum, December 10, 2010.

Figure 3. Literacy Furniture (Crafted Specifically for Reading and Writing Activities). PowerPoint slide, American Reading Forum, December 10, 2010.

Figure 4. Storage and Protection Artifacts for Literacy Technologies. PowerPoint slide, American Reading Forum, December 10, 2010.

Figure 5. Vision Aids and Accessories. PowerPoint slide, American Reading Forum, December 10, 2010.

Figure 6. Illumination (Technologies and Artifacts that Light Literacy Activities). PowerPoint slide, American Reading Forum, December 10, 2010.

Figure 7. Cuneiform clay tablet. C. 2350 BCE. An account of barley rations issued monthly to adults (30 or 40 pints) and children (20 pints), written in year 4 of King Urukagina, Ngirsu, Iraq. British Museum, London. BM 102081. Photo retrieved from http://en.wikipedia.org/wiki/File:Issue of barley rations.JPG

Figure 8. Tefillin: Qumran XQ Phyl 2. 1st century CE. Imaged reproduced by Gary D. Martin (2006) from *Tefillin from Qumran* by Yigael Yadin, (*XQ Phyl 1-4*), Plate XV. Retrieved from <u>http://aoal.org/bt/tefillin.html</u>

Figure 9. A Roman glass globe from Bonn Museum, Germany. Robert Temple holds the water-filled ball over letters to show how they can be enlarged. Photo by Robert Temple. Scanned from Temple (2000), Plate 50 with description, pp. 404-405.

Figure 10. Oldest surviving mirror. 6000-5900 BCE. Photograph of a young woman viewing herself in a mirror manufactured at Catal Höyük, Turkey. *The fascinating early history of optics! Archaeological optics 2009: our knowledge of the early history of lenses, mirrors, and artificial eyes!* (Invited Paper) by Jay M. Enoch. Photo retrieved from SPIE Digital Library, Vol. 7428 742803-36, *Figure 3.* doi:10.1117/12.828453

Figure 11. Roman waxed tablet replica. n.d. Photo retrieved from http://historicconnections.webs.com/historyofwriting.htm

Figure 12. Modern hand mirror. 2011. Photo by Sarah Dowhower.

Figure 13. Modern magnifying mirror. 2011. Photo by Sarah Dowhower.

Figure 14. Attributed to Python. *Aphrodite* detail. 350-340 BCE. Paestan Red Figure Greek Vase, Louvre N3157. Paris, Musée de Louvre. By the mirror's reflection above, Aphrodite is watching from heaven as her son-in-law Kadmos confronts the Drakon (Ismenian dragon) in the sky. If the mirror was concave, the scene would be enlarged. Retrieved from <u>http://www.theoi.com/Gallery/K10.16.html</u>

Figure 15. Tommaso Da Modena. *Forty Dominican Dignitaries.* 1352. Fresco, average height of 150 cm. Treviso, Italy, Chapter House of the Dominican Monastery of the Church of San Nicolo. Paintings of famous Dominican clerics in history: two popes, 18 cardinals, 17 Dominican friars and 3 faintly seen saints (Dominic, Peter Martyr and Aquinas) hard at work at their desks in scholarly pursuits. View a video of the cycle on four walls and photo from the Dominican History website:

http://dominicanhistory.blogspot.com/2011/05/forty-dominicans-at-their-desks.html For individual pictures of all the Dominicans in their cells see the *Cycle of the Dominicans* from the Dominican History website:

http://www.lionstrevisoduse.org/tomaso/eng/html/opere/capitolo/altri.htm

Figure 16. Tommaso Da Modena. *Portrait of Pietro Isnardo da Chiampo of Vicenza* with magnifying mirror. 1352. Fresco. Treviso, Italy, Chapter House of the Dominican

Monastery of the Church of San Nicolo. Image with permission of David A. Fleishman. Retrieved from http://www.antiquespectacles.com/slide shows/non vision aids/nva.htm

Figure 17. Master of the White Inscriptions. *Vincent de Beauvais, Author Portrait* detail. Late 15th century. Illuminated manuscript in *Speculum Historiale*, Royal 14 E I, f. 3, London, British Library. A Dominican monk, sitting at a desk and writing, frontispiece of Book 1. Retrieved from http://www.bl.uk/catalogues/illuminatedmanuscripts/ILLUMIN_ASP2Size=mid&IIID=4

http://www.bl.uk/catalogues/illuminatedmanuscripts/ILLUMIN.ASP?Size=mid&IIIID=4 3440

Figure 18. Tommaso da Modena. *Jerome in his Study* with detail of horned-shaped mirror. 1352. Column fresco, 210 x 515 cm. Treviso, Italy, Nave of the Church of San Nicolo. Photo by Gali-Dana. Retrieved from http://www.flickr.com/photos/crivelli/4184925154/

Figure 19. Niccolo Colantonio. *Jerome in his Study* and detail of horned-shaped mirror. 1445. Oil on wood, 125 x 151 cm. Naples, Museo di Capodimonte. Retrieved from http://en.wikipedia.org/wiki/File:Colantonio.jpg

Figure 20. Giovanni Battista Palatino. *Instruments of Writing* and detail of a hornedshaped writing mirror. 1540/1545/1566. Woodcut, 206 x 145 mm. *Libro nuovo d'imparare a scrivere* (New Book for Learning to Write). Rome: Camp di Fiore. Retrieved from The History of Graphic Design: Renaissance Writing Masters website: <u>http://aplacecalledspace.com/Handwriting_pages/WritingMasters.html</u> See entire book at the Internet Archive, Open Library website: <u>http://www.archive.org/stream/librodimgiovamba00pala#page/n0/mode/2up</u>

Figure 21. Reading stone in use. n.d. Plano-convex lens. Oberkochen, Germany, Zeiss Optical Museum. Image with permission of Dr. David A. Fleishman. Retrieved from http://www.antiquespectacles.com/history/reading_stone.htm

Figure 22. Modern dome magno-illuminator made of acrylic with magnification power of 4X (12 diopters). 2011. Photo by Sarah Dowhower.

Figure 23. Sloane Lens (60869-A). n.d. Biconvex lens ranging from 6.5-8.5 diopters and magnification of 2 " -3X. London, Natural History Museum, Sir Hans Sloane Collection. Photo by Robert Temple. Scanned from R. Temple (2000), Plate 53 with description on pp. 405.

Figure 24. Ludwig Konraiter. *St. Anna, Madonna with Babe and 10 Virgin Saints* from *Life of St. Mary and St. Ursula Altarpiece* and detail of St. Ottilia with reading stones. 1485–1490. Oil on panel. Innsbruck, Austria, Museum of Wilten Monastery (Tyrol). Scanned from C. Fugoni (2003) *Figure 17*, p. 24. Detail retrieved from http://www.optiker.at/archiv/galerie/wilten/wilten.htm

Figure 25. Lucos Cranach the Elder. *Saints Christina and Ottilia* detail. 1506. St. Catherine Altarpiece: Reverse of Shutters. Oil on linden, 123 x 67 cm. London, National Gallery. Retrieved from http://commons.wikimedia.org/wiki/File:Lucas_Cranach_the_Elder_-Saints_Christina_and_Ottilia_-Google_Art_Project.jpg

Figure 26. Table Reliquary and detail of #4 window. 1220-1225. Wood and rock crystal, 405 x 450 mm; diameter 64 mm of #4. Treasure Room in the Cathedral of Halberstadt, Germany. Retrieved by <u>http://www.transromanica.com/en/poi/?artikel=127</u>

Figure 27. Mauritius Rotunda or Chapel of the Holy Sepulcher. C. 1250-1260. Sculpture of painted sandstone, diameter 2.43 m, height 4.65 m. Chapel in the Cathedral of Constance, Germany. Photo retrieved from http://commons.wikimedia.org/wiki/File:Konstanz_Muenster_Heiliggrab.jpg?uselang=de

Figure 28. Greek Hippocrates as a pharmacist. C. 1250-1260. Sculpture of painted sandstone. Interior of the Gothic Holy Sepulcher, Mauritius Rotunda, Chapel in the Cathedral of Constance, Germany. Image with permission of David A. Fleishman. Retrieved from http://www.antiquespectacles.com/slide_shows/non_vision_aids/nva.htm

Figure 29. Tommaso Da Modena. *Portrait of Cardinal Nicolas of Rouen* and detail of single reading lens. 1352. Fresco. Treviso, Italy, Chapter House of the Dominican Monastery of the Church of San Nicolo. Retrieved from <u>http://www.wga.hu/frames-e.html?/html/t/tommaso/index.html</u>

Figure 30. Andrea de' Bartoli. *Philosophers confronting St. Catherine* detail. 1367-69. Fresco. Assisi, Italy, Chapel of St. Catherine of Alexandria, Lower Church of St. Francis and burial chapel of Franciscan Cardinal Albornoz (d. 1367). Image with permission of David A. Fleishman. Retrieved from http://www.antiquespectacles.com/rivet_spectacles/paintings/paintings.htm

Figure 31. Raphael. *Pope Leo X with Two Cardinals* and detail of single concave lens. 1517-1518. Oil on wood, 154 x 119 cm. Florence, Galleria degli Uffizi. Retrieved from http://www.wga.hu/frames-e.html?/html/r/raphael/5roma/5/09leo_x.html

Figure 32. Jacope Chimenti (called Jacope da Empoli). *Michelangelo Presents His Model of San Lorenzo to Leo X, 1617-19.* Paint on wood, 2.36 x 1.41 m. Florence, Casa Buonarotti. Retrieved from http://www.piccoligrandimusei.it/CasaBuonarrotiOpere.phtml

Figure 33. Examples of long and short handled quizzing glasses. In Hern (2004), *Figure 3.* Retrieved from <u>http://www.candicehern.com/collections/04/eyeglass.htm</u>

Figure 34. I. Robert and George Cruikshank. *Tom and Jerry Taking the Hint.* 1830. Oil on canvas. In Pierce Eagan's *Life in London*, 1830. Private Collection. Retrieved from

http://www.wikigallery.org/wiki/painting_229042/I.-Robert-and-George-Cruikshank/Tom-and-Jerry-taking-the-hint-at-Logics-being-blown-up-at-Point-Nonplus

Figure 35. French School. *Theodore Rousseau.* 1850. Engraving. Retrieved from http://www.nationalgallery.org.uk/artists/theodore-rousseau

Figure 36. Richard Evans. *Olinthus Gilbert Gregory.* 1835. Lithograph engraved by H. Robinson. Private collection. Retrieved from http://en.wikipedia.org/wiki/File:Olinthus_Gregory.jpg

Figure 37. Antoine Charles Horace Vernet (after). *A Lady in a Levantine Hat.* 1797. Aquatint engraving from *Incroyable et merveilleuse*, #6 plate of a series of fashion plates engraved by Georges Jacques Gatine (1773-1831). Retrieved from <u>http://www.1st-art-gallery.com/Carle-Vernet/A-Lady-In-A-Levantine-Hat,-A-Tiered-Skirt-And-A-Velvet-Jacket,-Plate-6-From-The-Incroyable-Et-Merveilleuse-Series-Of-Fashion-Plates,-Engraved-By-Georges-Jacques-Gatine-1773-1831-Published-1797-In-Paris.html</u>

Figure 38. Jean Auguste Dominique Ingres. *Madame Marcotte de Sainte-Marie* and detail of quizzer. 1826. Oil on canvas, 0.93 x 0.74 m. Paris, Musée du Louvre. Retrieved from

http://commons.wikimedia.org/wiki/File:Ingres_Madame_Marie_Marcotte.jpg

Figure 39. Pietro Longh. *The Geography Lesson.* Before 1785. Oil on canvas. Venice, Italy, Galleria Querini Stampalia. Retrieved from http://www.wikipaintings.org/en/pietro-longhi/the-geography-lesson

Figure 40. French cap monocle suspended from a forehead band, made of tortoiseshell and probably used for reading. Ayscough double-hinged side temples. Photo with permission of David A. Fleishman. Retrieved from http://www.antiquespectacles.com/slide shows/tortoiseshell/others/others.htm

Figure 41. Anna Dorothea Therbusch. *Self Portrait* detail of a spina-frontalis-monocle. C. 1780. Oil on canvas. Linz, Austria, Schlossmusuem. Image with permission of David A. Fleishman. Retrieved from http://www.antiquespectacles.com/people/people.htm

Figure 42. Anna Dorothea Therbusch. *Self Portrait.* 1776-1777. Oil on canvas, 153.5 x 118 cm. Berlin, Gemaldegalerie Staaliche. Retrieved from http://commons.wikimedia.org/wiki/File:Anna_Dorothea_Therbusch_001.jpg

Figure 43. Claude Monet. *Young Man with a Monocle* detail. 1857. Pastel and watercolor on paper, 240 x 160 mm. Paris, Musee Marmottan. Retrieved from Art Resources.

http://www.artres.com/c/htm/CSearchZ.aspx?o=&Total=1&FP=13987589&E=22SIJM5 WBMS9P&SID=JMGEJNBNASG6M&Pic=1&SubE=2UNTWAOWXJ@5 *Figure 44.* Walter Greaves. *Portrait of James Abbott McNeill Whistler (1834-1903).* 1871. Oil on canvas, 63.5 x 76.2 cm. Private Collection. Image with permission of David A. Fleishman. Retrieved from http://www.artrenewal.org/pages/artwork.php?artworkid=10414&size=large

Figure 45. John Singer Sargent. Joseph Chamberlain. 1896. Oil on canvas, 1619 x 914 mm. London, National Portrait Gallery. Retrieved from http://en.wikipedia.org/wiki/File:Joseph_Chamberlain_John_Singer_Sargent_1896.jpeg

Figure 46. James Spedding (attributed to). *Alfred Tennyson, 1st Baron Tennyson (1809-1892).* C. 1831. Pencil drawing, 197 x 140 mm. London, National Portrait Gallery. Retrieved from <u>http://www.npg.org.uk/collections/search/portraitLarge/mw06247/Alfred-Tennyson-1st-Baron-</u>

Tennyson?search=ss&OConly=true&firstRun=true&sText=alfred+tennyson&LinkID=m p04454&role=sit&rNo=0

Figure 47. Elliott & Fry. *Alfred Tennyson, 1st Baron Tennyson.* Late 1896s. Carbon print on card mount, 189 x 121 mm. London, National Portrait Gallery. Retrieved from <u>http://www.npg.org.uk/collections/search/portrait/mw06247/Alfred-Tennyson-1st-Baron-Tennyson?LinkID=mp04454&role=sit&rNo=0</u>

Figure 48. Karl Marx. n.d. Tinted photograph. Copyright owned by AKG. Retrieved from <u>http://www.dailymail.co.uk/tvshowbiz/article-1041751/Poshs-proletariat-past-</u>Victoria-Beckham-descended-Communist-comrade-Karl-Marx.html

Figure 49. George Grosz. *Pillars of Society with Nazi and Monocle* detail. 1926. Oil on canvas, 200 x 108 cm. Berlin, Germany, Staatliche Museen. Retrieved from http://www.abcgallery.com/G/grosz/grosz26.html

Figure 50. Herbert Morton Stoops. *They'll Give You a Fresh Start in Life.* 1941. Oil on canvas. Philadelphia, Atwater Kent Museum. Cover of *Life*, January 4, 1943. Retrieved from

http://books.google.com/books?id=n04EAAAAMBAJ&pg=PA32&lpg=PA32&dq=%22t hey%27ll+give+you+a+fresh+start%22&source=bl&ots=sBhu03LgeP&sig=hJ5qVvr6m 0qvHim121OqCx_fXSg&hl=en&ei=MSPdTebGK6by0gHj4Oz5Dw&sa=X&oi=book_re sult&ct=result&resnum=2&ved=0CB0Q6AEwAQ#v=onepage&q=%22they%27ll%20gi ve%20you%20a%20fresh%20start%22&f=false

Figure 51. Edgar Degas. *At the Café Châteaudun.* 1869-1871. Oil on card, 23.5 x 19.5 cm. London, National Gallery. Retrieved from http://www.nationalgallery.org.uk/paintings/hilaire-germain-edgar-degas-at-the-cafe-chateaudun

Figure 52. Francois Xavier Fabre. *Portrait of Abbot Thomas Valperga of Caluso* and detail of a portable magnifier. 1802. Oil on canvas,. Torino, Italy, Muse Civico d'Arte

Image with permission of David A. Fleishman. Retrieved from http://www.antiquespectacles.com/slide shows/previous/previous 2.htm

Figure 53. Charles Spencelayh. *Fingerprints.* 1953. Oil on canvas, 43 x 53 cm. Bournemouth, UK, Russell-Cotes Art Gallery and Museum. Retrieved from http://www.russellcotesartshop.co.uk/art/387515/Fingerprints

Figure 54. R. Klausner. *Close Scrutiny.* 19th century. Oil on panel, 37.5 x 26.5 cm. Private Collection. Retrieved from <u>http://www.wikigallery.org/wiki/painting_203651/R.-Klausner/Close-Scrutiny</u>

Figure 55. Norbet Goeneutte. *Dr. Paul Gachet.* 1891. Oil on panel, 35 x 26.7 cm. Paris, Musee d'Orsay. Retrieved from <u>http://www.musee-orsay.fr/en/collections/index-of-works/notice.html?no_cache=1&nnumid=001302&cHash=0a9c459605</u>

Figure 56. Norman Rockwell. *Book of Romance.* 1827. Oil on canvas, 32 x 38 in. Stockbridge, MA, Norman Rockwell Museum. Retrieved from http://collection.nrm.org/search.do?id=201281&db=object&view=detail

Figure 57. Nuns' choir at Wienhausen Abbey, Germany. 1301. Photo retrieved from http://www.viatoura.de/kloster-wienhausen/fotogalerie/1.html For more pictures and information also see Kloster Wienhausen website: http://www.kloster-wienhausen.de/

Figure 58. Three types of rivet spectacles, type 1, type 2 and type 3. 1330. Earliest surveying rivet spectacles found at Wienhausen Abbey, Germany in 1953. Photo with permission of David A. Fleishman. Retrieved from http://www.antiquespectacles.com/topics/wienhausen/3/spectacles.htm

Figure 59. Salisbury nun wearing rivet type 1 spectacles and detail. 1330/1440. Corbel on the north aisle of the Parish Church of Sarum St. Martin, Salisbury, UK. Image with permission of David A. Fleishman.

http://www.antiquespectacles.com/topics/religion/sculpture/sculpture.htm

Figure 60. Westphalian Master. *The Relatives of St Anne (Holy Kinship)* detail of Zebedee reading with rivet type 1 spectacles. C. 1470. Panel painting, 69 x 144 cm. Maastricht, Netherlands, Basilica of St. Servatus, Cathedral Treasury. Also called *The Blood-Relationship (Consanguinity) of St. Anna.* Retrieved from http://web.mac.com/musicksmonumentdownl/Holy_Kinship_Maastricht/Holy_Kinship_html

Figure 61. Konrad von Soest. *Glasses Apostle (St. Luke?).* 1403. Wildungen Altar. Tempera on wood, 188 x 152 cm. Germany, Church of Bad Wildungen. One of the oldest depictions of eyeglasses north of the Alps. Retrieved from http://commons.wikimedia.org/wiki/File:Conrad_von_Soest, %27Brillenapostel%27_(14 03).jpg

*Figure 62.*_Tommaso Da Modena. *Cardinal Hugh de Saint Cher* and detail of rivet reading glasses. 1352. Fresco. Treviso, Italy, Chapter House of the Dominican Monastery of the Church of San Nicolo. Earliest known representation of spectacles in a painted work of art. Images with permission of David A.Fleishman. Retrieved from http://www.antiquespectacles.com/rivet_spectacles/paintings/paintings.htm

Figure 63. Dr. Vincent Ilardi (1925-2009), Emeritus Professor of History, sity of Massachusetts wearing replica of rivet type 1 spectacles. Photo with permission of David A. Fleishman. Retrieved from http://www.antiquespectacles.com/topics/ilardi/images/ilardi.images.htm

http://www.antiquespectacles.com/topics/ilardi/images/ilardi_images.htm

Figure 64. Monk in a choir with tong spectacles, a prototype of scissor spectacles. 14th century. Choir book illuminated manuscript. Florence, Convento di San Marco. Images with permission of David A. Fleishman. Retrieved from http://www.antiquespectacles.com/rivet_spectacles/representations/representations.htm

Figure 65. Antiphonarium and detail of singer with spectacles. 15th century. Illuminated manuscript. Florence, Biblioteca Laurenziana, MS. Edili 146, fol. 62. Images with permission of David A.Fleishman. Retrieved from http://www.antiquespectacles.com/topics/ilardi/images/ilardi images.htm

Figure 66. Andrea de' Bartoli. *Philosophers confronting St Catherine* detail of single lens and spectacle use. 1367-69. Fresco. Assisi, Italy, Chapel of St Catherine of Alexandria, Lower Church of St Francis and burial chapel of Franciscan Cardinal Albornoz (d. 1367). Image with permission of David A. Fleishman. Retrieved from http://www.antiquespectacles.com/rivet_spectacles/paintings/paintings.htm

Figure 67. Circle of Derick Baegert. *Death of Saint Martin of Tours and St George as Dragon Slayer* detail. C. 1480. Oakwood altarpiece. Munster, Germany, Westfälisches Landesmuseum. Image with permission of David A.Fleishman. Retrieved from http://www.antiquespectacles.com/rivet_spectacles/altarpieces.htm

Figure 68. Death of Mary and detail. 1370. Left inside wing of the Altar of Tyrol Castle. Tempera on beechwood altarpiece. Innsbruck, Austria, Museum Ferdinandeum. Full altar retrieved at

http://www.shafe.co.uk/crystal/images/lshafe/Schloss_Tirol_altarpiece.jpg Detail retrieved from http://www.antiquespectacles.com/rivet_spectacles/altarpieces/altarpieces.htm

Figure 69. Workshop of Hans and Jakob Strueb. *Death of Mary* detail of Bartholomew and an older Apostle with rivet 1 type spectacles. 1510. Pine panel altarpiece, 73 x 93 cm. Kunzelsau, Germany, Museum Würth Collection. Image with permission of David A.Fleishman. <u>http://www.antiquespectacles.com/topics/religion/paintings/paintings.htm</u>

Figure 70. Death of Mary and detail. C. 1418. Altarpiece. Paint on wood panel. Hannover, Germany, Neidersächsisches Landesmuseum. Possibly the earliest representation of tinted spectacles. Image with permission of David A. Fleishman. Retrieved from

http://www.antiquespectacles.com/rivet_spectacles/paintings/paintings.htm#

Figure 71. Master of the Altar Albrecht. *Dormition of the Virgin* and detail of apostle with rivet 2 spectacles in shared reading. 11th century/1437-1439. Albrecht Altarpiece. Painted wood. Vienna, Klosterneuberg Monastery. Retrieved from http://newsite.augustiniancanons.org/2003/08/2003o-assumption-2/

Figure 72. Earliest surviving leather framed spectacles found in Willibald Pirchkheimer's study. C. 1520-30. Eisenach, Germany, Wartburg Castle. From Ilardi, 2007, p. 313. <u>Retrieved from</u> http://books.google.com/books?id=peIL7hVOUmwC&pg=PA162&dg=Wartburg+Castle

http://books.google.com/books?id=pelL/hVQUmwC&pg=PA162&dq=Wartburg+Castle +leather&hl=en&ei=8hWyTYi1HvCD0QH8n8mkCQ&sa=X&oi=book_result&ct=result &resnum=1&ved=0CCoQ6AEwAA#v=onepage&q=Wartburg%20&f=false

Figure 73. Jan Van Eyck. *The Virgin with the Canon van der Paele* (1370-1443) and detail of leather spectacles. 1436. Oil on wood panel, 141 x 176.5 cm. Bruges, Groeninge Museum. Retrived from http://www.wga.hu/index1.html

Figure 74. Lorenzo Costa, the Elder. *Group Portrait of the Bentivoglio Family* and detail of a cannon. 1493. Oil and tempera on panel, 105 x 82 cm. Madrid, Museo Thyssen-Bornemisza. Retrieved from http://pintura.aut.org/SearchProducto?Produnum=14847

Figure 75. Ludovico Mazzolino. *The Adulteress before Christ* and detail of leather bow spectacles and eyeglass case. Early 16th century. Oil on panel. Zagreb, Croatia, Croatian Academy of Science and Art, Strossmayer's Old Masters Gallery. In Ilardi, 2007, p. 295. Retrieved from

http://books.google.com/books?id=peIL7hVQUmwC&printsec=frontcover&dq=ilardi+sp ectacles&source=bl&ots=0lXdsNYCUa&sig=4rAVeBp0jZ4F8PJo4SyZ0IxlBuI&hl=en& ei=giuyS4n8AcH_lgf7mvSTBQ&sa=X&oi=book_result&ct=result&resnum=2&ved=0C AkQ6AEwAQ#v=onepage&q&f=false

Figure 76. Jose Van Cleve (after). *Saint Jerome in His Study* and detail of bow spectacles. 16-17th centuries. Oil on canvas, 85 x 63 cm. London, British Optical Association. Retrieved from College of Optometrists website at <u>http://www.college-optometrists.org/en/knowledge-</u>centre/museyeum/online_exhibitions/artgallery/memento.cfm

Figure 77. Georges de la Tour. *Saint Jerome Reading*. 1621-23. Oil on canvas on board, 55 x 62.3 cm. London, Royal Collection, Hampton Court. Retrieved from http://commons.wikimedia.org/wiki/File:LA_TOUR,_Georges_de_- Saint Jerome Reading (1621-23).jpg

Figure 78. Georges de La Tour. *Saint Jerome Reading.* 1652. Oil on canvas, 122 x 93 cm. Paris, Musée du Louvre. Retrieved from http://www.culture.gouv.fr/Wave/image/joconde/0002/m503604_91ee1908_p.jpg

Figure 79. William van Drielemburg. *Jerome Reading* and detail of Nuremberg wire spectacles. Oil on canvas, 115 x 118 cm. Palermo, Italy, Private Collection. Retrieved from http://www.anticoantico.com/categoria_dettaglio.asp?articolo=48707

Figure 80. Jan Lievens. *Old Woman Reading.* 1621-23. Oil on panel, 71.4 x 67.3 cm. Philadelphia Museum of Art. Retrieved from http://www.flickr.com/photos/distan/5346262727/

Figure 81. Rembrandt (and/or Jan Lievens). *Portrait of Rembrandt's Mother.* 1629. Oil on canvas, 76 x 64 cm. Salisbury, UK, Collection of the Earl of Pembroke, Wilton House. Retrieved from <u>http://www.flickr.com/photos/gatochy/3355963474/</u>

Figure 82. Antonio Pisanello. Three men, one with cap rivet spectacles (from the records of the Council of Constance). First half of the 15th century. Drawing of brown ink wash, 0.190 x 0.203 m. Paris, Musée du Louvre. http://www.culture.gouv.fr/Wave/image/joconde/0284/m503501 d0003465-000 p.jpg

Figure 83. B. Caraviello. *Bishop Alfonso of Liquori.* 1768. Paint on burlap. Pagani, Italy, Museum Alfonsioano di Pagani. Image with permission of David A. Fleishman. Retrieved from <u>http://www.antiquespectacles.com/slide_shows/previous/previous_2.htm</u>

Figure 84. El Greco. *The Portrait of a Cardinal* detail. C. 1600. Oil on canvas, 170.8 x 108 cm. New York, Metropolitan Museum of Art. Retrieved from http://www.wga.hu/frames-e.html?/html/g/greco_el/1596-600/13cardin.html

Figure 85. Émile Zola (1840-1902). 1902. Photo retrieved from http://en.wikipedia.org/wiki/File:ZOLA 1902B.jpg

Figure 86. Edouard Manet. *Portrait of Émile Zola* and detail of pince-nez. 1868. Oil on canvas, 146 x 114 cm. Paris, Musee d'Orsay. Retrieved from http://en.wikipedia.org/wiki/File:Manet, Edouard_-_Portrait_of_Emile_Zola.jpg

Figure 87. Marcellin Gilbert Desboutin. *Edgar Degas.* Before 1900. Oil on burlap, 46 x 31 cm. Versailles, France, Musée National du Château et des Trianons. Retrieved at http://commons.wikimedia.org/wiki/File:Marcellin_Desboutin_- Portrait Edgar Degas.jpg

Figure 88. Karl Johann Becker-Gundahl. *Theodore Roosevelt.* 1925. Oil on panel, 34.3 x 22.9 cm. San Marino, CA, The Huntington Library, Art Collections, and Botanical Gardens. Retrieved from <u>http://www.artfinder.com/work/theodore-roosevelt-carl-johann-becker-gundahl/</u>

Figure 89. Scarlett temples with swirls. C. 1728-1730. Brass frames. Germany, Kassel Museum. Photo with permission of David A. Fleishman. Retrieved from http://www.antiquespectacles.com/slide_shows/temple_spectacles.htm

Figure 90. Scarlett temples with rings. C. 1780. Iron framed. Washington, DC, Museum of Science and Industry. Photo with permission of David A. Fleishman. Retrieved from

http://www.antiquespectacles.com/slide_shows/temple_spectacles/temple_spectacles.htm

Figure 91. Straight-arm temples. C. 1800. Brass round framed with C-bridge and small finials. From the original Hugh Orr Collection. Photo with permission of David A. Fleishman. Retrieved from http://www.antiguespectacles.com/trade_cards/associated/associated.htm

Figure 92. Anton Graff. *Portrait of Daniel Nikolaus Chodowiecki.* 1800-1801. Oil on canvas. Berlin, Staatliche Museum. Retrieved from http://commons.wikimedia.org/wiki/File:Graff Portrait Daniel Chodowiecki.jpg

Figure 93. Jean-Baptiste Chardin. *Self-Portrait with glasses.* 1771. Pastel, 46 x 38 cm. Paris, Musée du Louvre. Retrieved from <u>http://www.wga.hu/frames-</u>e.html?/html/c/chardin/index.html

Figure 94. Jean-Baptiste Chardin. *Self-Portrait with eyeshade.* 1775. Pastel on blue paper, 46 x 38 cm. Oil on canvas, Paris, Musée du Louvre . Retrieved from http://www.wga.hu/frames-e.html?/html/c/chardin/index.html

Figure 95. Sliding adjustable temples with teardrop finials. C. 1750. Iron framed. Photo scanned from Orr, 1985, p. 87.

Figure 96. Turn-pin X-bridge temples. 1860. Silver framed. Photo scanned from Orr, 1985, p. 86.

Figure 97. Double-hinged spectacles. C. 1750. Tortoiseshell framed. Photo scanned from Orr, 1985, p. 86.

Figure 98. Joshua Reynolds (as copied by a student). *Self Portrait* and detail of wig turn-pin spectacles. 1788. Oil on canvas, 75.2 x 63.2 cm. London, Royal Collection. Retrieved from

http://www.royalcollection.org.uk/eGallery/object.asp?maker=13041&object=400699&r ow=16

Figure 99. Turn-pin spectacles owned by Sir Joshua Reynolds. Before 1792. Silver with round lens frame, double-hinged with medium tear-shaped finials. Private Collection. Photo with permission of David A. Fleishman. Retrieved from http://www.antiquespectacles.com/people/people_earlier2.htm

Figure 100. Patrick Henry's surviving double-hinged temples. Before 1799. Richmond, VA, Virginia Historical Society. Photo with permission of David A. Fleishman. Retrieved from http://www.antiquespectacles.com/people/people earlier2.htm

Figure 101. Thomas Sully. Patrick Henry. 1851. Oil on canvas. Richmond, VA, Virginia Historical Society. The artist first painted this image in 1815 from a miniature painting taken from life in 1795 by the artist's older brother Lawrence. Retrieved from http://www.vahistorical.org/sva2003/henry.htm

Figure 102. Martin's Margins. n.d. Steel, clear round lens, C-bridge, double-hinged temples with large teardrop ends. Photo retrieved from the American Optometric Association website: http://www.aoa.org/x10953.xml

Figure 103. Benjamin Martin (1758). An Essay on Visual Glasses (Vulgarly called SPECTACLES) Wherein it is shewn, From the Principles of OPTICS, and the Nature of the EYE, that the Common Structure of those Glasses is contrary to the Rules of Art, to the Nature of Things, & c. and very prejudicial to the EYES, 4th edition. Owned by the British Optical Association Library, London. Retrieved from http://www.collegeoptometrists.org/en/knowledgecentre/museyeum/online exhibitions/artgallery/antiques.cfm

Figure 104. Admiral Peter Rainier. 1778-1787. Oil on canvas, 76.5 x 63.8 cm. Boston, Museum of Fine Arts. Retrieved from http://www.mfa.org/collections/object/admiralpeter-rainier-31255

Figure 105. Addison Smith four lens spectacles first patented in 1783. Unknown owner. Image with permission of David A. Fleishman. Retrieved at http://www.antiguespectacles.com/slide shows/4 lens/4 lens.htm

Figure 106. John Richardson-type four lens spectacles first patented in 1797 adjustable sides and teardrop finials. n.d. Storrs, New York State Museum. Photo with permission of David A. Fleishman. Retrieved at

http://www.antiquespectacles.com/slide shows/4 lens/4 lens.htm

Figure 107. Philip Hewins. Portrait of Andrew Jackson detail of four lens spectacles. 1833. Hartford, Connecticut Historical Society. Retrieved from http://emuseum.chs.org:8080/emuseum/media/view/Objects/4276/3666?t:state:flow=845 a0631-eaf8-4f9c-8f07-56673a733f93

Figure 108. Benjamin Franklin. Franklin's design for bifocals. May 23, 1785. Washington, DC, Library of Congress. Image of original drawing in his letter retrieved from http://explorepahistory.com/displayimage.php?imgId=5697

Figure 109. Temple spectacles style worn by Benjamin Franklin before bifocals. Second half of 18th century. Steel C-bridge with round frames, temple sides with large circular

finials. Photo with permission of David A. Fleishman. Retrieved from http://www.antiquespectacles.com/topics/franklin/spectacles/spectacles.htm

Figure 110. David Martin. *Benjamin Franklin.* 1766. Oil on canvas, 124.5 x 101.6 cm. Washington, DC, White House Collection. Retrieved at http://www.benfranklin300.org/frankliniana/result.php?id=331&sec=0

Figure 111. John Trumbull. *Benjamin Franklin.* 1778. Oil on wood, 5 " x 4 3/8 in. Yale University Art Gallery. Retrieved from <u>http://commons.wikimedia.org/wiki/File:Benjamin_Franklin_by_John_Trumbull_1778.jp</u> eg

Figure 112. Charles Willson Peal. *Benjamin Franklin* (in split-lens bifocals). 1785. Oil on canvas, 23 x 18 # in. Philadelphia, Pennsylvania Academy of the Fine Arts. Retrieved from http://commons.wikimedia.org/wiki/File:Peale_-_Benjamin_Franklin.jpg Detail retrieved from http://www.antiquespectacles.com/topics/franklin/artwork/artwork.htm

Figure 113. Detail from Jefferson's letter to John McAllister showing a sketch of design for spectacles. December 1, 1806. Retrieved from The Jefferson Monticello website, Eyeglasses, *Thomas Jefferson Encyclopedia*, Charlottesville, VA: http://wiki.monticello.org/mediawiki/index.php/Image:Spectacles-sketch.jpg

Figure 114. Abraham Lincoln's two pair of spectacles with cases. 1865. Washington, DC: Library of Congress. The smaller pair was made by Burt and Willard Glasses dated January 4, 1859. Photo retrieved from <u>http://www.spectaclesblog.com/?p=1865</u>

Figure 115. Franklin C. Courter. *Abraham Lincoln with His Son, Tad.* C. 1929. Oil on hardboard, 116.8 x 90.2 cm. Washington, DC, National Gallery of Art. Retrieved from <u>http://www.nga.gov/fcgi-bin/tinfo_f?object=42915</u>

Figure 116. Philipp Galle after Johannes Stradanus. *Conspicilla* (Latin for eyeglass) in *Nova Reperta* (New Discoveries). C. 1580/1600. Engraving. Paris, Bibliotheque Nationale. Retrieved from http://www.vlaamsekunstcollectie.be/nl/uitvinding van de bril.aspx

Figure 117. Frederick D. Hardy. *Try This Pair.* 1864. Oil on canvas, 41 cm. London, Guildhall Art Gallery. Retrieved from : http://www.wikigallery.org/wiki/painting 210958/Frederick-Daniel-Hardy/Try-this-pair

Figure 118. Edward Scarlett. Focus Mark of 70. C. 1728. Photo. Photo with permission of David A. Fleishman. Retrieved from http://www.antiquespectacles.com/trade_cards/associated.htm

Figure 119. Paul Gauguin/Ky Dong. *Self-Portrait.* 1902. Oil on canvas, 42 x 25 cm. Bern, Switzerland, Kunstmuseum. Retrieved from http://en.wikipedia.org/wiki/File:Gauguin Autoritratto 1902.jpg

Figure 120. Claude Monet's tinted ear-fitting cataract spectacles. C. 1923 or later. Paris, Musee Marmottan Monet. Photo with permission of David A. Fleishman. Retrieved from <u>http://www.antiquespectacles.com/people/people_present2.htm</u>

Figure 121. Sir Edward Burne-Jones. *Rudyard Kipling.* 1899. Oil on canvas, 153 x 60 cm. New York, Granger Collection. Retrieved from http://en.wikipedia.org/wiki/File:Rudyard_Kipling_by_Sir_Philip_Burne-Jones_1899.jpeg

Figure 122. Jacques-Emile Blanche. *James Joyce.* 1935. Oil on canvas, 1251 x 876 mm. London, National Portrait Gallery. Retrieved from http://www.npg.org.uk/collections/search/portrait/mw03533/James-Joyce?LinkID=mp02467&role=sit&rNo=2

Figure 123. James Joyce. Two pages from a *Finnegan's Wake Notebook* at Buffalo. n.d. Retrieved from the website of Brepols, publishers of the *Finnegans Wake Notebooks* at Buffalo, Daniel Ferrer, Geert Lernout & Vincent Deane (Eds.):

http://docs.google.com/viewer?a=v&q=cache:ngAAfPufc80J:www.brepols.net/publisher s/pdf/Joyce.pdf+finnigans+wake+notebook&hl=en&gl=us&pid=bl&srcid=ADGEESj3p1 2cppBVv0-

Q477gHhbvIAmEZ4WCIx_ISFylU9KEZSBD4f1gzs_OGQgfOt8_fxsIwG45jLvtm77d9g bzpGDnQfKasRvRpekTFQLwb0b8AMxVE4hpFVdtTW64F8K0f5U45cnc&sig=AHIEtb QUyGDuWntAgm8fOGnsV14suS-Ptw

Figure 124. Hemingway in Kenya. 1953-54. Photo retrieved from http://www.shakariconnection.com/ernest-hemingway-books.html

Figure 125. Randy Hofman. *Hemingway.* 1996. Oil on canvas. Ocean City, MD, Artist's Collection. Retrieved from artist's website: http://img408.imageshack.us/img408/1996/hemingway4ke3.jpg

Figure 126. Sir Joshua Reynolds. 1775. *Portrait of Samuel Johnson ("Blinking Sam")*. Oil on canvas, 76 x 63 cm. San Marino, CA. The Huntington Library, Art Collections, and Botanical Gardens. Retrieved from http://commons.wikimedia.org/wiki/File:Samuel Johnson by Joshua Reynolds 2.png

Figure 127. J. Anthony Willis. *Official Portrait of President Dwight D. Eisenhower.* 1967. Oil on canvas. Washington, DC, The White House Collection. Retrieved at http://en.wikipedia.org/wiki/File:Dwight_D._Eisenhower_official_Presidential_portrait.j pg

Figure 128. Gold clear plastic browline glasses owned by Eisenhower. C. 1960. Photo retrieved from

http://historical.ha.com/common/view_item.php?Sale_No=625&Lot_No=25500

Figure 129. French School, 20th Century. *AMOR Lunettes.* 1957. Color lithograph. Paris, Bibliotheque des Arts Décoratifs. Advertisement for 'Amor' glasses from *Elle*. Retrieved from <u>http://tootsie.skynetblogs.be/archive/2009/11/13/ancienne-reclame-dans-les-magazines.html</u>

Figure 130. Alexis Smith. *Men Seldom Make Passes at Girls Who Wear Glasses.* 1985. Wall painting with two framed mixed-media collages, 353.7 x 462.3 x 9.5 cm. San Diego, Museum of Modern Art. Retrieved from http://www.mcasd.org/collection/detail.php?Artist=Alexis%20Smith

Figure 131. Andy Warhol. *Julia Warhol.* 1974. Silkscreen. Retrieved from http://ifitshipitshere.blogspot.com/2011/05/from-durer-to-dali-famous-artists-paint.html

Figure 132. Alex Katz. *Poet Kenneth Koch.* 1970. Color lithograph, 702 x 558 mm. http://www.alexkatz.com/archive/pop.html?id=126484753622899

Figure 133. Chuck Close. *Frank.* 1969. Acrylic on canvas, 274.3 x 213.4 x 7.6 cm. Minneapolis Institute of Art. Retrieved from http://www.artsmia.org/viewer/detail.php?v=12&id=1721

Figure 134. Andy Warhol. *Lee Iacocca.* 1985. Silkscreen. Retrieved at http://www.a212.com/2010/01/art-mix-of-artist-4.html

Figure 135. Alex Katz. *Ada with Sunglasses.* 1989. Oil on masonite. Waterville, ME, Colby Museum of Art. Retrieved from http://www.colby.edu/academics_cs/museum/search/Obj4519?sid=14152&x=353657

Figure 136. James Wyeth. *Andy Warhol* (wearing large clear acetate framed glasses). 1976. Pittsburgh, Andy Warhol Museum. Retrieved from http://www.tfaoi.com/am/11am/11am292.JPG

Figure 137. Chuck Close. *Self-Portrait.* 2004-2005. Oil on canvas, 102 x 86 in. Private Collection. Retrieve from <u>http://visualarts.walkerart.org/detail.wac?id=1528&title=past%20exhibitions&style=imag</u> <u>es</u>

Figure 138. Gerard Dou. *Night School.* 1663-65. Oil on panel, 53 x 40.3 c Amsterdam Rijksmuseum. Retrieved from <u>http://ca.wikipedia.org/wiki/Fitxer:Dou,_Gerard_-</u> <u>The_Night_School_hi_res_-_c. 1660.JPG</u> *Figure 139.* D. George Thompson after James William Edmund Doyle. *The Literary Club of 1781.* 1851. Stipple and line engraving, London, National Portrait Gallery. Retrieved from <u>http://en.wikipedia.org/wiki/The_Club_%28Literary_Club%29</u>

Figure 140. Salomon Koninck. *A Philosopher.* 1635. Oil on canvas, 17 x 71 cm. Madrid, Museo del Prado. Retrieved from <u>http://www.wga.hu/frames-</u>e.html?/html/k/koninck/salomon/index.html

Figure 141. Francusco de Goya. *The Annunciation.* C. 1785. Oil on canvas, 40.3 x 23.2 cm. Boston, Museum of Fine Arts. Retrieved from <u>http://www.the-athenaeum.org/art/detail.php?ID=30199</u>

Figure 142. Jacopo Robusti Tintoretto. *St. Mary in Egypt* detail. 1582-1587. Oil on canvas. Venice, Scuola Grande di San Rocco. Retrieved from http://www.wga.hu/index1.html

Figure 143. Quint Buchholz. *The Journey.* 1987. Unknown media. Artist's collection. Retrieved from <u>http://www.quintbuchholz.de/en/pictures/1983-1990.html</u>

Figure 144. Frank W. Benson. *The Reader.* 1910. Oil on canvas, 64.14 x 76.84 cm. Private collection. Retrieved from <u>http://www.the-</u>athenaeum.org/art/detail.php?ID=25137

Figure 145. Atanur Dogan. *Old Man Reading a Book.* C. 2001. Watercolor. Artist's Collection. <u>http://elartedelalectura.blogspot.com/2006/01/cuadros-atanur-dogan.html</u>

Figure 146. Cloister of Battle Abbey as it might have appeared in the 13th century. n.d. Color drawing. English Heritage Photo Library at the Victoria and Albert Museum website: <u>http://www.vam.ac.uk/content/articles/m/medieval-monasteries/</u>

Figure 147. St. Thomas Aquinas in *Super quarto libro sententiarum.* 1484. Illuminated manuscript. Naples, Bibliotheca Nazionale, MS. VII. B. 4, c, fol. 13r. Scanned from Becket, 1998, p. 63.

Figure 148. Rembrandt van Ryn. *Scholar Reading.* 1631. Oil on canvas, 60 x 48 cm. Stockholm, Nationalmuseum. Retrieved from : http://www.wikigallery.org/wiki/painting_295504/Harmenszoon-van-Rijn-

Figure 149. Johannes Vermeer. *Lady Writing a Letter with her Maid.* 1670-1672. Oil on panel, 72.2 x 59.7 cm. Dublin, Naitonal Gallery of Ireland. Retrieved from http://www.wga.hu/frames-e.html?/html/v/vermeer/index.html

Figure 150. John Koch. *Woman Reading a Newspaper.* 1975. Oil on canvas. Unknown owner. Retrieved from Corbis Images website: http://www.corbisimages.com/Search#q=John+Koch&ac=John+Koch&cat=21,20,17&mt =1&cf=1 *Figure 151.* Eastman Johnson. *Boyhood of Lincoln.* 1868. Ann Arbor, University of Michigan Museum of Art. Oil on canvas, 46.42 x 37.32 in. Retrieved from http://www.iatwm.com/200608/AmericanABC/index.html

Figure 152. Solomon Alexander Hart. *An Early Reading of Shakespeare.* 1883. Oil on canvas, 90.2 x 69.8 2 cm. Private Collection. Retrieved from http://www.artrenewal.org/pages/artwork.php?artworkid=5340&size=large

Figure 153. Jan Cornelisz Vermeyen. *St. Jerome Meditating.* 1525-1530. Oil on panel, 38 x 47 cm. Paris, Musée du Louvre. Retrieved from <u>http://www.wga.hu/frames-e.html?/html/v/vermeyen/index.html</u>

Figure 154. Deer fat oil lamp. Magdalenian culture, 17,000 BP (carbon dating). Red sandstone, 8 ! in long. Found in Lascaux Cave in Montignac, Dordogne, Aquitaine, France. Les Eyzies-de-Tayac, <u>National Prehistory Museum</u>. Retrieved from <u>http://commons.wikimedia.org/wiki/File:Lampe_a_graisse_-_Lascaux.jp</u>

Figure 155. Impression of cave painting with stone lamps. n.d. Drawing. Scanned from O'Dea, 1958, p. 32.

Figure 156. Michelangelo. 1508-1512. *Erythrean Sibyl #17* detail of saucer lamp. Fresco. Sistine Chapel. Vatican, Rome. Retrieved from http://en.wikipedia.org/wiki/File:Michelangelo Buonarroti 033.jpg

Figure 157. Ancient Greek clay oil lamp. C. 400 BCE. Retrieved from http://www.liveauctioneers.com/item/8762931

Figure 158. Roman open oil lamp with gladiators. n.d. Koln, Germany, Romisch-Germanisches Museum. Retrieved from <u>http://en.wikipedia.org/wiki/File:RGM_120-1.jpg</u>

Figure 159. Roman bronze oil lamp used in upper class households. C. 200-400 CE. Width 5.6 cm, length 10.9 cm, height 4.2 cm. Retrieved from Et Tu Antiquities, Oil Lamps website: http://ettuantiquities.com/oil lamps thumbnails 1.htm

Figure 160. Roman double-spouted lamp with Fortuna in the discus. Mid-1st century CE. Pottery mouldmade, length 21.3 cm. Retrieved from the Ancient Resource, LLC website: <u>http://www.trocadero.com/ancientresourcellc/items/1048254/item1048254.html</u>

Figure 161. Pierre-Pau Prudhon. *Minverve Light the Ways for Arts and Sciences.* First quarter of 18th century. Oil on canvas, 14 x 18 cm. Dijon, Musee des Beauz-Arts. Retrieved from

http://www.culture.gouv.fr/Wave/image/joconde/0332/m013704_0008505_p.jpg

Figure 162. Hanging oil lamp. 300 CE. Fresco. Catacomb of Saints Marcellino and Peter. Rome, Italy. Retrieved from http://www.artres.com/c/htm/CSearchZ.aspx?o=&Total=1&FP=12881519&E=22SIJM5 PYZPWZ&SID=JMGEJNB4CBDCZ&Pic=1&SubE=2UNTWA0M0JYG

Figure 163. Claude-Henre Watelet. *Old Philosopher seated, reading a large book.* 1786. Engraving, 19.2 x 14.6 cm. San Francisco, De Young Fine Arts Museums. Retrieved from <u>http://deyoung.famsf.org/search-collections</u>

Figure 164. Author (Burchard) writing on bifolium in Lives of St Edmund and St Fremund by John Lydgate. 1434. Illuminated manuscript. London, British Library, MS. Harley 2278, f. 74r. Retrieved from <u>http://www.bl.uk/catalogues/illuminatedmanuscripts/ILLUMIN.ASP?Size=mid&IIIID=1</u> 5579

Figure 165. Charles Louis Muller. *The Study and Inspiration.* 1864. Oil on canvas, 92 x 53 cm. Paris, Musée du Louvre. Retrieved from http://cartelen.louvre.fr/cartelen/visite?srv=car_not_frame&idNotice=5879&langue=fr

Figure 166. Gerbrand van den Eeckhout. *Scholar with his books.* 1671. Oil on canvas, 64.5 x 49 cm. Budapest, Museum of Fine Arts. Retrieved from http://commons.wikimedia.org/wiki/File:Gerbrand_van_den_Eeckhout_- Scholar with his Books - WGA7468.jpg

Figure 167. Example of floating-wick of a Roman vase lamp, late period. 4rd century CE. Glass, 8 5/8 in diameter, folded in flared rim. Boca Raton, FL, Griffin Gallery Ancient Art. Retrieved from <u>http://www.griffingallery.net/items/963761/en2store.html</u>

Figure 168. Saint Luke with hanging vase lamp from the *Constantinople New Testament*, Gospel of Luke 1. Mid-10th century. Illuminated manuscipt. London, British Library, BL Add. 28815, f.76v. Retrieved from http://www.bl.uk/onlinegallery/sacredtexts/constantinople_lg.html

Figure 169. A Hazzan in a Spanish Synagogue reading the Haggadah in *Sister Haggadah.* C. 1350. Illuminated manuscript. Vellum, 23.3 x 19 cm. London, British Library, Or. MS. 2884 fol., 17v. Retrieved from http://picasaweb.google.com/distambouli/Judaica#5424826674667726690

Figure 170. Litergical chanting with three lamps in the *Windmill Psalter.* 1280-1300. Illuminated manuscript. Vellum, 320 x 215 mm. New York, The Pierpont Morgan Library, MS M. 102, fol. 100r. Retrieved from http://utu.morganlibrary.org/medren/single_image2.cfm?imagename=m102.100ra.jpg&p age=ICA000004387 *Figure 171.* Georges de La Tour. *Magdalene with the Smoking Flame* and detail of float-lamp. C. 1640. Oil on canvas, 117 x 92 cm. Los Angeles County Museum of Art. Retrieved from <u>http://www.wga.hu/frames-e.html?/html/l/la_tour/georges/index.html</u>

Figure 172. Drawing of Egyptian hieroglyph of a possible floating-wick lamp. C. 1353 BCE. Drawing by Dowhower of a depiction represented in Robins, 1939, p. 45.

Figure 173. Cresset-stone lamp with four cups. No older than 1172. Purbeck marble, 9 " x 7 " x 5 in deep. Dorset, England, Bindon Abbey. Retrieved from http://people.bath.ac.uk/lismd/dorset/wool/fryer-1898.html

Figure 174. Crusie Lamp. Retrieved from the Rams Horn Studio Early Lighting 2 website by Beth Maxwell Boyle: <u>http://www.ramshornstudio.com/early_lighting_2.htm</u>

Figure 175. Phoebe Lamp. Late 18th-early 19th century. Celtic cast iron double bowl design, height 12 # in., bottom bowl 2 1/8 x 4 # in. Retrived from http://www.halslamppost.com/Miscellaneous%20Lamps/slides/Double%20Crusie%20Oil%20Lamp.html

Figure 176. Betty Lamp with cover. Sheet steel. German and used by H. C. Kempt, Potter. Retrieved from the Old Time Lamp Shop website: http://utu.morganlibrary.org/medren/single_image2.cfm?imagename=m102.100ra.jpg& page=ICA000004387

Figure 177. Govanni Girolamo Savoldo. *Matthew and the Angel* and detail. 1534. Oil on canvas, 93 x 124.5 cm. New York, The Metropolitan Museum of Art. Retrieved from http://www.wga.hu/frames-e.html?/html/s/savoldo/index.html

Figure 178. Trophime Bigot. *Young girl pouring oil into a lamp.* 1650. Oil on canvas. Rome, Galleria Doria Pamphili. Retrieved from <u>http://www.1st-art-gallery.com/thumbnail/366299/1/Girl-Pouring-Oil-Into-A-Lamp.jpg</u>

Figure 179. Frontispiece with Rabbi Gamallel and students in the *Sarajevo Haggadah.* C. 1350. Illuminated manuscript in copper and gold. Vellum. Sarajevo, National Museum of Bosnia and Herzegovina. Retrieved from http://thechristianity.wordpress.com/2010/03/31/was-jesus'-last-supper-a-seder/

Figure 180. Monk Sabas Reads to the Emperor Necephorus III in the *Homilies of John Chrysostom.* 1071. Illuminated manuscript, tempera and gold on vellum. Bibliotheque Nationale de Paris, MS. Coislin 79, fol. 1(2 bias)r. Retrieved from http://commons.wikimedia.org/wiki/File:Nicephorus_III_and_Sabas_BnF_Coislin79_fol_2bis.jpg

Figure 181. Office for the Dead at Vespers, Requiem Mass in the *The Umfray Hours*. 1420. Iluminated manuscript. Parchment, 200 x 140 mm. London, British Library, Sloane 2468, fol. 115. Retrieved from

http://www.bl.uk/catalogues/illuminatedmanuscripts/ILLUMIN.ASP?Size=mid&IllID=6 554

Figure 182. Sébastien Bourdon. *Presentation in the Temple.* C. 1644. Oil on canvas, 71 x 61 cm. Paris, Musée du Louvre, Paris. Retrieved from http://upload.wikimedia.org/wikipedia/commons/6/6e/Bourdon%2C_S%C3%A9bastien - Presentation in the Temple - c. 1644.jpg

Figure 183. Charles Spencelayh. *The Last Night of Hanukkah.* Before 1958. Oil on canvas. Private Collection. Retrieved from http://www.bridgemanart.com/image/Spencelayh-Charles-1865-1958/The-Last-Night-of-Hanukkah/87049c20504549428303acd6e353a2fb

Figure 184. Asaf al-Daula. *The Muharram Festival in Lucknow*, India (Nawab of Oudh, listening at night to the maulvi reading from the scriptures.) C. 1795. London, British Library. Retrieved from

http://www.columbia.edu/itc/mealac/pritchett/00routesdata/1700_1799/avadh_early/asifuddaulah.html

Figure 185. Barthel Bruyn The Elder. *Vanitas Still Life.* 1524. Oil on wood, 61 x 51 cm. Otterlo, Rijksmuseum Kröller-Müller. Retrieved from http://commons.wikimedia.org/wiki/File:Barthel_%28Bartholom%C3%A4us%29_Bruyn - Vanitas.JPG

Figure 186. Rembrandt. *Student at a Table by Candlelight.* 1642. Copper etching, 14.8 x 13.5 cm. Boston, Museum of Fine Arts. Retrieved from http://www.wikipaintings.org/en/rembrandt/student-at-a-table-by-candlelight-1642

Figure 187. Josef Israels. *The Philosopher* (An Old Man Writing by Candlelight). 1885-1899. Oil on canvas, 65 x 54.6 cm. London, National Gallery. Retrieved from http://www.nationalgallery.org.uk/paintings/jozef-israels-an-old-man-writing-by-candlelight

Figure 188. Gerard Dou. *Astronomer by Candlelight.* Late 1650s. Oil on panel, 12 5/8 x 8 3/8 in. Los Angeles, J. Paul Getty Museum. Retrieved from http://cgfa.acropolisinc.com/dou/p-dou30.htm

Figure 189. Gerrit van Honthorst. *The Duet.* 1623-1624. Oil on canvas, 79.1 x 95.3 cm. Quebec, Montreal Museum of Fine Arts. Retrieved from http://www.mbam.qc.ca/en/provenance/oeuvre_310.html

Figure 190. Matthias Stomer. *Young Man Reading by Candlelight.* Before 1650. Oil on canvas. Stockholm, National Museum. Retrieved from http://uk.wikipedia.org/wiki/%D0%A4%D0%B0%D0%B9%D0%BB:Matthias_stom_young_man_reading_by_candlelight.jpg Figure 191. Hendrick Terbrugghen. Old Man Writing by Candlelight. 1623-1627. Oil on canvas. Northampton, Smith College Museum of Art. Retrieved from http://libraryland.tumblr.com/post/782820004/hendrick-ter-brugghen-old-man-writing-by

Figure 192. French School. Portrait of a Man by Candlelight. 18th century. Oil on canbas, 61.6 x 50.8 cm. Originally owned by Cleveland Museum of Art; sold in Sotheby Auction, 2011. Owner unknown. Retrieved from http://www.mutualart.com/Events/Auctions/Old-Master---19th-Century-European-Art/74157FB838B13453/AuctionResults

Figure 193. Joseph Wright of Derby. Girl Reading a Letter with Old Man Reading over her Shoulder. 1767. Oil on canvas, 76.5 x 63.5 cm. Retrieved from http://commons.wikimedia.org/wiki/File:Joseph Wright of Derby. A Young Girl Rea ding a Letter, with an Old Man Reading over Her Shoulder. c. 1767-70.jpg

Figure 194. Johann Monles Culvershouse. Reading the News. 1860. Oil on canvas, 50.48 x 75.57 cm. Private Collection. Retrieved from http://www.theathenaeum.org/art/full.php?ID=16615

Figure 195. William Hogarth. The Politician (Shortsighted Man). 1775. Engraving. Inscribed on plate is: Will.m Hogarth, Inv.t. Etch'd by J. K. Sherwin Etch'd from an Original Sketch of Wm. Hogarth's, in the Possession of Mr. Forrest. Pub'd as the Act direct by Jane Hogarth, Oct. 31st, 1775. 18.5 x 14.8 in. Retrieved from Darvill's Rare Prints website:

http://www.darvillsrareprints.com/Hogarth%20The%20Politician.htm

Figure 196. J. H. Clark. Shooting the Harpoon at a Whale. C. 1814. Colored engraving. Unknown Owner. Retrieved from http://en.wikipedia.org/wiki/File:Shooting the Harpoon at a Whale - J.H. Clark.png

Figure 197. Georg Friedrich Kersting. Man Reading by Lamplight. 1814. Oil on canvas. 48 x 37 cm. Winterthur, Oskar Reinhart Collection. Retrieved from http://commons.wikimedia.org/wiki/File:Georg Friedrich Kersting -Man Reading at Lamplight - WGA12122.jpg

Figure 198. Argand lamp. 2005. Drawing. Retrieved from http://commons.wikimedia.org/wiki/File:Argand01.jpg

Figure 199. Jacques-Louis David. Portrait of Doctor Alphonse Leroy with a Quinquet Lamp. 1783. Oil on canvas, 91 x 72 cm. Montpellier, Musee Fabre http://commons.wikimedia.org/wiki/File:Jacques-Louis David -_Portrait_of_Doctor_Alphonse_Leroy_-_WGA06051.jpg

Figure 200. Georg Friedrich Kersting. The Elegant Reader. 1812. Oil on canvas, 47.5 x 37.5 cm. Weimar, Schlossmuseum. Retrieved from http://commons.wikimedia.org/wiki/File:Kersting_-_Der_elegante_Leser.jpg

Figure 201. John Fredrick Peto. *Still Life with Book, Pipe, Lard Lamp, and Match.* Early 19th century. Oil on board, 2.86 x 15.24 cm. Private Collection. Retrieved from <u>http://www.the-athenaeum.org/art/full.php?ID=14371</u>

Figure 202. Samuel Finley Bresse Morse. *Noah Webster.* Before 1872. Oil on canvas, 84.7 x 72.7 cm. New Haven, CN, Beinecke Rare Book & Manuscripts Library, Yale University. Retrieved from http://commons.wikimedia.org/wiki/File:Portrait of Noah Webster.jpg

Figure 203. Noah Webster's lard oil lamp: one of a pair used to compile his dictionary. Photo retrieved from American Collector Archive website: http://www.collectorsweekly.com/articles/lamps-and-illuminants/

Figure 204. John Graham Gilbert. *William Murdoch (Murdock).* Before 1866. Oil on canvas. Edingurgh, National Museums of Scotland. Retrieved from http://www.europeana.eu/portal/record/00401/924BC0C2F5FCB32E46DDBC80DE72A7 28C53DF145.html

Figure 205. Paul- Gustave Dore and Blanchard Jerrold. *Scripture Reader in a Night Refuge* (Poor House) from *London: A Pilgrimage.* 1872. Engraving. Retrieved from http://www.cf.ac.uk/encap/skilton/illustr/Dore143.html

Figure 206. Richard Carlton Woodville. *Politics in an Oyster House.* 1848. Oil on canvas, 40.6 x 33 cm. London, Walker Art Gallery. Retrieved from <u>http://www.the-athenaeum.org/art/full.php?ID=20768</u>

Figure 207. Mary Cassatt. *Under the Lamp.* C. 1882. Soft-ground etching and aquatint in black on cream wove paper, 192 x 218 mm. Chicago, Art Institute of Art. Retrieved from http://www.artic.edu/aic/collections/artwork/26693?search_id=41

Figure 208. Sir William Orchardson. *Her Mother's Voice.* 1888. Oil on canvas, 1016 x 1486 mm. London, Tate Gallery. Retrieved from http://www.tate.org.uk/servlet/ViewWork?cgroupid=999999961&workid=10956&search_id=13539

Figure 209. Marc Chagall. *The Smolensk Newspaper.* 1914. Oil and graphite on paper mounted on canvas, 37.9 x 50.2 cm. Philadelphia Museum of Art. Retrieved from http://www.wikipaintings.org/en/marc-chagall/the-smolensk-newspaper-1914

Figure 210. Pierre Bonnard. *Under the Light of the Lamp.* 1899. Oil on cardboard, 34 x 44 cm. Paris, Musee d'Orsay. Retrieved from http://pintura.aut.org/SearchProducto?Produnum=19307

Figure 211. Cleveland study lamp. Signed & Patent Dated 1863-1871-1873. Nickel over brass. Photo retrieved from the Richard Miller Lamp site: http://richardmillerlamps.com/studentlamps.htm

Figure 212. Paul Signac. *Woman with Lamp.* 1890. Oil on wood, 24.5 x 15 cm. Paris, Musée d'Orsay, <u>http://www.musee-orsay.fr/en/collections/index-of-works/resultat-collection.html?no_cache=1&zoom=1&tx_damzoom_pi1%5Bzoom%5D=0&tx_damzoom_pi1%5BxmlId%5D=003019&tx_damzoom_pi1%5Bback%5D=en%2Fcollections%2F index-of-works%2Fresultat-collection.html%3Fno_cache%3D1%26zsz%3D9</u>

Figure 213. Peter Vilhlem Ilsted. *Little Girl Reading and Knitting.* C. 1913. Oil on canvas, 13 # x 11 5/8 in. Retrieved from Kodner Auction Catalogue for 5/12/2010 website: http://www.kodner.com/catalogue/051210/images/view.asp?id=00586-168&desc=44++-+++Peter+Vilhelm+Ilsted+Danish+%281861-1933%29+Color+Mezzotint++%22Little+Girl+Reading+and+Knitting%22+Circa+1913. +Pencil+Signed+Lower+Right+and+Limited+Edition+50/26.+Original+Gallery+Label+en+Verso.+Good+to+Very+Good+Condition.+Measures+13-1/4+Inches+by+11-5/8+Inches+%28sight%29+Frame+Measures+15-1/3+Inches+by+13-5/8+Inches.+Shipping+\$54.00+%28estimate+\$150-\$250%29

Figure 214. Rochester parlor lamp. C. 1880. Height 50 cm. Photo retrieved from http://home.zipworld.com.au/~oil-lamp/rochesterhandles.html

Figure 215. Harriet Backer. *By Lamplight.* 1890. Oil on canvas, 64.7 x 66.5 cm Bergen, Norway, Kunstmuseum. Retrieved from <u>http://arthistory.about.com/od/from_exhibitions/ig/becoming_edvard_munch/bem_aic_09_02.htm</u>

Figure 216. Knut Ekvall. *The Reading Lesson.* 1912. Oil on panel, 60.2 x 75.5 cm. Private Collection. Retrieved from http://www.artrenewal.org/pages/artwork.php?artworkid=10928&size=large

Figure 217. Pablo Picasso. *Portrait of Joseph Cardona.* 1899. Oil on canvas, 100 x 63 cm. New York, Museum of Modern Art. Retrieved from http://pintura.aut.org/SearchProducto?Produnum=28790

Figure 218. Pablo Picasso. *Still Life with Skull, Book, and Petroleum lamp.* 1946. Oil on plywood, 54 x 65 cm. Paris, Musee Picasso. Retrieved from http://www.tate.org.uk/liverpool/exhibitions/Picasso/room2.shtm

Figure 219. Juan Gris. *Still Life with an Oil Lamp.* 1911-1912. Oil on canvas, 48 x 33 cm. Otterlo, Netherlands, Kroller-Muller Museum. Retrieved from http://www.wikipaintings.org/en/juan-gris/still-life-with-oil-lamp-1912

Figure 220. Joan Miro. *The Kerosene Lamp.* 1924. Charcoal, with red Conte and colored crayons, white oil paint on canvas, 810 x 1003 mm. Chicago, Institute of Art. Retrieved from <u>http://www.artic.edu/aic/collections/artwork/52780</u>

Figure 221. Quint Buchholz. *Book Lighthouse.* C. 2000. Oil on canvas. Artist's Collection. Retrieved from <u>http://ooh-so-ooh-so.tumblr.com/post/1016545605/by-quint-buchholz</u>

Figure 222. Benjamin West. *Benjamin Franklin, Drawing Electricity from the Sky.* 1816. Oil on canvas, 33.5 x 25.5 cm. Philadelphia, Museum of Art. Retrieved from http://commons.wikimedia.org/wiki/File:Franklinwithkey.jpg

Figure 223. Craigside, Newcastle, Northumberland, UK. 2005. Photo retrieved from http://en.wikipedia.org/wiki/File:Cragside1.jpg

Figure 224. Sir William Armstrong in his Study. C. 1880. Illustration in the *Graphic Newspaper*, England. Retrieved from <u>http://www.williamarmstrong.info/science</u>

Figure 225. John Cameron. *Thomas Edison in his Laboratory*. Illustration for Cassell's *Romance of Famous Lives* edited by Harold Wheeler. C. 1930. Retrieved from http://www.lookandlearn.com/history-images/M091591/Edison-in-his-laboratory?img=5&search=John%20Cameron&cat=all&bool=phrase

Figure 226. John Sloan. The *New Homestead.* 1930. Tempera and oil on panel, 24 x 32 in. Santa Fe, Gerald Peters Gallery. Retrieved from http://www.gpgallery.com/works/view/2565/206/0/0/0/0/0/0/1/9

Figure 227. Frank Weston Benson. *The Camp.* 1925. Oil on canvas, 55.9 x 71.1 cm. Private Collection. Retrieved from http://www.artrenewal.org/pages/artwork.php?artworkid=39626&size=large

Figure 228. Han-Wu Shen. *Quiet Night.* Oil on canvas, 96.52 x 76.2 cm. Collection of Akshay Sanghavi. Retrieved from http://www.artrenewal.org/pages/artwork.php?artworkid=38378&size=large

Figure 229. Pablo Picasso. Girl Reading at a Table. 1934. Oil on canvas, 162.2 x 13.5 cm. New York, The Metropolitan Museum of Art. Retrieved from http://www.metmuseum.org/works_of_art/collection_database/modern_art/reading_at_a_table/objectView.aspx?&OID=210006954&collID=21&vw=0

Figure 230. Norman Rockwell. *And Daniel Boone Comes to Life on the Underwood Portable* detail. 1923. Oil on canvas. Private Collection of Steven Spielberg. The painting is the first Rockwell purchased by Spielberg. Retrieved from http://newsdesk.si.edu/photos/norman-rockwell-and-daniel-boone-comes-life-underwood-portable

Figure 231. Roy Lichtenstein. *Still Life with Lamp.* 1976. Oil and magna on canvas, 54 x 74 inches. Private Collection. Retrieved from http://www.artchive.com/artchive/L/lichtenstein/lichtenstein lamp.html

Figure 232. Janet Fish. *Barry* (The Poet). 1982. Oil on canvas, 60 x 65 cm. Private Collection. Retrieved from http://www.askart.com/AskAPT/artists/search/Search Repeat aspx2searchtupe=IMAC

http://www.askart.com/AskART/artists/search/Search_Repeat.aspx?searchtype=IMAGE S&artist=34511

Figure 233. Deborah DeWitt Marchant. *Evenings at Home.* 2005. Private Collection. Retrieved from <u>http://elynslibrary.com/</u>

Figure 234. Deborah DeWitt Marchant. *Friday Nights.* 2006. Pastel, 23 x 27 in. Private Collection. Retrieved from http://artslice.blogspot.com/2008 06 01 archive.html

Figure 235. Jan Steen. *Rhetoricians at a Window.* 1661-1666. Oil on canvas, 75.9 x 58.6 cm. Philadelphia Museum of Art. Retrieved from http://commons.wikimedia.org/wiki/File:Steen_Rhetoricians_at_a_Window.jpg

Figure 236. Gerrit van Honthorst. *Old Woman Examining a Coin by Lantern.* (1623). Oil on canvas, 75 x 60 cm. The Kremer Collection. Retrieved from <u>http://uncertaintimes.tumblr.com/post/1148229001/gerrit-van-honthorst-old-woman-examining-a-coin or http://www.thekremercollection.com/art/artists/Pieter-Verelst/The-schoolmaster-and-his-pupils/</u>

Acknowledgements

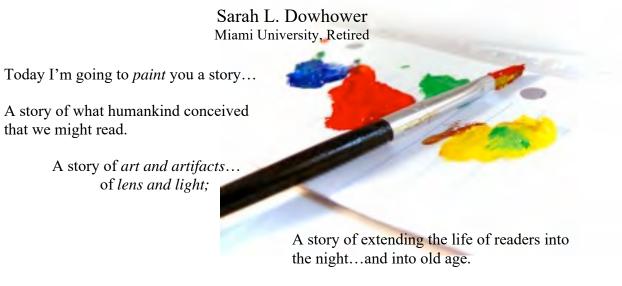
I would like to thank Roseanne Worrell for the many hours of proofing and editing she put into this manuscript. What an eagle eye for typos and tense issues!

I also would like to convey my appreciation to Dr. David Fleishman curator of the wonderful online museum and encyclopedia, *Antique Spectacles & Other Vision Aids* at <u>http://www.antiquespectacles.com/</u> Without the information, resources, and images on the site and Dr. Fleishman's expert advice and input, I would not have been able to provide such a comprehensive history of vision aids.

Most of all, there are no words to express my gratitude to my husband, Craig Edwards for all his editing suggestions and extreme tolerance and patience through the writing process.

Dowhower, S. L. (2011). Painted Literacy: Lens and Light, Celebrating the Tools That Help Us See Text. *American Reading Forum Annual Yearbook* [Online], Vol. 31.

Painted Literacy: Lens and Light Celebrating the Tools That Help Us See Text



Introduction

To be concise, I would like to picture for you through *works of art*, the long line of *tools and technologies* that have defined our literacy history and practices and helped us to see and process text better. This story of lens and light has three parts: the evolution of (a) early vision aids (b) double lens spectacles (both of which help focus the words), and (c) illumination tools (that brighten the page).

Theoretical Framework

Before I chronicle the development of these vision aids that have extended our literacy lives, let me first *frame*, so to speak, a short rationale as to why this might be important to consider. For the theoretical background I draw from the work of the Literacy Research Group at Lancaster University (Barton, Hamilton, & Ivanic, 2000) and Christina Haas (1996).

The *socially situated literacy* scholarship of David Barton and his group of researchers (Barton, Hamilton, & Ivanic, 2000) speaks to the significance of studying broad literacy *practices*, literacy *events* that reflect these practices, and specific texts that are part of those events. Thus, "literacy practices are best understood as a set of social practices; these can be inferred from events which are mediated by written text" (p. 8).

Situated literacy practices involve reading and writing with different:

- 1. *Purposes* (communication, information production and retrieval, religious intent, education, aesthetics, recreation, organization, critique, etc.);
- 2. Domains (school, church, workplace, home, library, sports venue, etc.);
- 3. *Habits* (listening vs. speaking, oral vs. silent, individual vs. group; active vs. passive, intensive vs. extensive);
- 4. *Participants* (male/female, religious/secular, rich/poor, literate/illiterate, etc.) as well as;
- 5. Varying *values and beliefs* about literacy.

Christina Haas (1996) argued that the best way to understand these literacy practices is to study their artifacts or what she calls " the *materiality of literacy*." She viewed literacy as language made material and "through writing, the world of tools and artifacts is joined to the symbolic world of language" (p. 3). Thus, the "acts of reading and writing...are inescapably technological" (p. 205).

Supporting the importance of materiality, Baron (1999) maintained that writing (viz., the alphabet) was the first technology of literacy and that "the computer is simply the latest step in a long line of writing technologies" (p. 17). We often lose sight of the small incremental developments made in writing technologies. They are so subtle that they become culturally transparent and natural to us. Consequently, we do not see them as *technological* (Baron, 1999; Haas, 1996).

New literacy technologies begin in a restricted community with only a small number of participants. Often involving a high cost and status/elitist power structure, users keep the technology to themselves, but over time gradually extend it to the larger general community. Consequently, cost decreases and the technology become familiar, spreads across populations and becomes a natural form of communication (Baron, 1999; Haas, 1996). Witness the development and dissemination of computers from the elite to the masses over the last 30 years—recently, the E-book and smart phone phenomena.

As each new literacy form and surface (from clay tablets to electronic tablets) evolved, a plethora of supporting technologies and materials developed: writing tools and accessories designed to accompany each form, furniture specifically built for different reading/writing activities, preservation devices crafted for storage and protection, and lights and vision aids invented to improve ability to see text. Together, these technologies and artifacts are indelibly tied to literacy practices and how people go about the business of reading and writing in daily life, driving our historical practices and ultimately, shaping innovative practices to come.

Essentially, "to understand contemporary literacy it is necessary to document the ways in which *literacy is historically situated*; literacy practices are as fluid, dynamic and changing as the lives and societies of which they are a part" ((Barton, Hamilton, & Ivanic, 2000, p. 13). However, "...change and time in literacy practices can often be overlooked because both are particularly difficult to document" (Tusting, Ivanic & Wilson, 2000, p. 217). Thus, historical written and associated archaeological evidence

are critical in helping us *situate* or create the past. *Art representations*, in particular, provide vivid and lush images of reading and writing activities and artifacts in action over centuries and across cultures: the context giving meaning to literate behaviors in each unique snapshot of time, place, and people.

The Gift of Art to Literacy

In truth, artists, quite unintentionally and serendipitously, have given the world a huge gift. They have put literacy practices, at the heart of thousands of paintings from ancient to contemporary times, literally making reading and writing come to life. For reading educators, historians and art aficionados these artistic works of people reading and writing through the ages are:

- 1. A proverbial feast for the eyes,
- 2. A critical source of what we know about how people learned to become literate,
- 3. A *powerful provenance* of the changing nature over time of both public and private literacy practices, and
- 4. A detailed *visual record* of the long line of literacy technologies and associated artifacts—the stuff of literacy.

The Stuff of Literacy

Indeed, the *stuff of literacy* entails hundreds of artifacts. As I researched the amazing array of these, I found the examples fell into six categories as shown in Figures 1-6. Because of the extensive nature of literacy artifacts, I will explore in this paper only the latter two categories, viz., *Vision Aids* and *Illumination*, and how these tools of lens and light have better-improved mankind's ability to see text—through the eyes of artists.

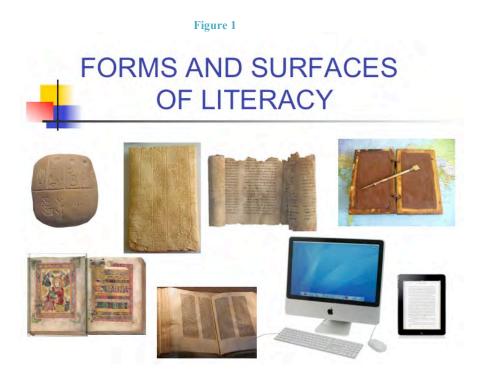


Figure 2

WRITING TOOLS AND ACCESSORIES



Figure 3





Figure 5







Earliest Vision Aids

From the inception of writing some 4000 years ago in the 19th century BCE, the process of reading and writing had to be difficult as literates aged (*Side Bar 1*). Supposedly lacking tools to enhance their vision, Cicero (106-43 BCE) and several other Roman authors wrote complaining about their weakening eyesight and how they had to be read to by literate slaves, as they grew older.

However, fresh analysis of both new and old documents and archeological evidence in the last few decades suggests that the ancients—*whether with normal or poor eyesight*—did use various means to improve their vision of text. We know that some sort of magnification had to exist because of the numerous examples of microscopic writing and carving from antiquity that still exist today or were documented in early writings (Enoch, 2007; Ilardi, 2007; Rosenthal, 1996; Temple, 2000; Willach, 2008). Let me give you three examples:

The world's first readers and writers living in the Mesopotamia region were scribes who were accountants and secretaries. They worked with excruciatingly tiny cuneiforms on small clay tablets that they cradled in their hands (Fischer, 2003). (Picture our current smart phones or PDAs!) Writing was so tiny (micro) that the text would have been impossible to read by the naked eye. Figure 7 shows one such tablet an issuing of barley ration (c. 2350 BCE).

In another instance, archeologists working at the Dead Sea Scroll excavation in Qumran unearthed several tefillins (phylacteries) from the 1st century CE with Hebrew so minute

that (except for a severely myopic condition) only a magnification of the writing makes it legible (Enoch, 1998). (See Figure 8 and Footnote¹.)

Struggling to See Text: 3 Major Vision Problems

- **Hyperopia (farsightedness)**
 - Inability to see close writing clearly
 - Type of refractive error as light hits the retina
 - Problem exacerbated at night when eyes are tired or light is dim
 - Corrected with convex lenses
 - Improved with better light
- **Myopia (nearsightedness)**
 - Inability to see text far away clearly
 - Type of refractive error as light hits the retina
 - Problem exacerbated at night when eyes are tired or light is dim
 - Corrected with concave lenses
 - Improved with better light
- Presbyopia (meaning 'the eyes of the old' in Greek)
 - Slow loss of the ability to actively focus on close text
 - Generally due to normal aging; lens become less flexible and loses elasticity
 - Corrected with non-prescription reading glasses that magnify letters
 - Improved by increasing the available light.
 - May well have been the impetus for single and double lens vision aids development in the 1200s.

Side Bar 1

In the same century, Pliny the Elder (23-79 CE) in his *Natural History* (77 CE) noted that Cicero (in a lost manuscript dated 1 BCE) wrote of a parchment copy of Homer's poem *The Iliad* that was written in micro-script enclosed in a nutshell (Temple, 2000). The famous phrase "in a nutshell" survives today.

> Figure 7. Cuneiform clay tablet



Figure 8. Qumran microscopic tefillin



The big question is what did early writers and readers use to see tiny letters?

Water Globes

Our first hint is textual: Seneca, the Younger (c. 4-65 CE) the Roman Philosopher wrote of the magnification of text by use of water globes, i.e., an enhanced water-based reading tool. In his book *Natural Questions* he said, "Letters, however small and obscure, are seen larger and clearer through a glass ball filled with water...." (as cited in Ilardi, 2007, p. 42). Allegedly, Seneca boasted that he read "all the books of Rome" by viewing the pages through the water.

Somewhat later, Christian Father Clement of Alexander (2nd Century CE) wrote about enlarged "images seen through the water, and things seen through pellucid [clear] and transparent bodies" (as cited in Temple, 2000, p. 78).

In his book The Crystal Sun, Robert Temple (2000), demonstrated the magnification

power of a tiny Roman glass globe from the Bonn Museum. When he filled the ball with water and held it over text, the letters appeared much larger (Figure 9).

Many scholars believe these tiny pocket-sized balls along with the sun, served as burning-globes for cauterizing wounds and starting fires. Temple (2000) suggests that hundreds of these Roman mass-produced items owned by museums actually have been mislabeled as make-up globes (also called toilet globes) used for holding of perfumes and other items for women.

Figure 9. Roman water globe



Mirrors

Seneca, the Younger also alluded to the use of mirrors as vision enhancing tool for reading and close work (Ilardi, 2007). As an artifact, mirrors are actually far older than glass spheres.

Figure 10 is a photograph of the oldest extant mirror. Found in south-central Turkey and manufactured 8,000 years ago (Enoch, 2006, 2007, 2009) from obsidian (a type of dark igneous volcanic glass), the mirror shows an image Figure 10. Oldest surviving mirror



of the woman holding the mirror. Some mirrors were slightly concave and clearly could have been used for magnification.

Although there is little written evidence attesting to mirrors as vision aids, scholars believe they "played a lengthy and important role in early vision corrections as magnifiers" (Enoch, 2006, p. 775) for an extended period before we had spectacles— enlarging and enhancing faded lettering. Pliny the Elder, the Roman historian speaks of mirrors held perpendicular to improve images in the 1st century CE (Rosenthal, 1996). Around 1280 CE, Heinrich Frauenlob (1250/1260-1318), Middle High German poet, wrote a poem describing how writing can be made readable for an old person with the use of (presumably concave) mirrors (Rosenthal, 1996) and about the same time French author Jean de Meun (c. 1250-1305) discussed "the marvelous powers that all things that are very small—thin letters, very narrow writing...are seen as so great and large and are put so close to the observers...that one can read them...." (as cited in Ilardi, 2007, p. 44).

In addition to magnification, readers and writers used mirrors for a second reason: their substantial properties of illumination—a topic I will address in the last part of this paper. "A mirror was thought to focus and concentrate light, and reflect it on to one's desk to help one in one's reading" as well as continuous writing (Thornton, 1997, pp. 167-168).

Far earlier in history, mirrors (like water globes) were commonly used as combustion and cauterizing agents, but were also part of another unique literacy practice—that of capturing the reflection of the sun to melt the wax of tablets (Figure 11). The light, in



effect, erased the text on the wax surface; once hardened, the blank surface could be reused for writing, much like the modern eraser or the computer delete key does today.

Classical and medieval images in art, suggest that mirrors with concave shaped surfaces were made usually out of metal and then subsequently, glass. Some look amazingly similar to our hand-mirrors (Figure 12) and stemmed magnifying

Figure 12. Modern hand mirror



mirrors of today (Figure 13).

The major challenge of using a mirror to enlarge text is that the image is reversed. Two adaptive reading practices evolved over centuries to solve the problem.

Figure 13. Modern magnifier mirror



First was the cultivation of the skill of reading and writing in reverse images. Indeed, medieval reader/writers as well as early printers and engravers were quite adept at working with mirror images and did so routinely. For instance, we know Leonardo da Vinci wrote in Italian in reverse (right to left) and his writings are quite "legible by the aid of a mirror" (Frugoni, 2003, p. 7).

Another practice was the use of a second mirror to right the enlarged image of script. In 1589, Giambattista della Porta in his Magia Natural described the 2-mirror process of reading: "Place a

concave mirror on your chest so that its back touches your chest and place the writing at the point of inversion; in back of it position a plane mirror so that it is opposite your eyes; then you will be able to read without difficulty the much enlarged images of letters reflected from the concave to the plane mirror" (cited in Ilardi, 2007, p. 46).

To my surprise and delight, an experiment following Giambattista's directions with a makeup mirror and a hand mirror (Figures 12 and 13) allowed me to enlarge almost a whole page at a time so as to be quite readable. However, this technique could only be used for reading because with my hands full, writing was out of the question.

As to painted depiction of mirrors, we have a few ancient examples pictured on Greeks vases and in Roman frescos. Generally, the images were of various Gods (Aphrodite, Laso and Eros) whose attributes or symbols were mirrors, as in Figure 14. While there is a smattering of depictions of mirrors in illuminated manuscripts between 1185-1350, no paintings associated mirrors with real-life literacy practices until a groundbreaking Italian fresco (Figure 15) in 1352 was painted by Tommaso (Tomaso) da Modena (c. 1325-1379).

Figure 14. *Aphrodite* with hand mirror



On the north wall in the Chapter House of the San Nicoló Monastery at Treviso, Italy (Figure 16), Tommaso depicted a concave mirror flanked with writing equipment, implying the tool's reflective ability to ease the eyes and magnify the letters. On a shelf above the tonsured miracle-worker St. Pietro Isnardo of Chiampo (or Vicenza) (c. 1200-

1244), stands a concave reading mirror mounted on a metal stand accompanied by a pen and inkpot on a little ledge below. The mirror looks surprising like our modern makeup mirrors.

In all, Tommaso pictured 40 real-life Dominican Order dignitaries seated in their tiny cells either studying or composing. The cells formed a single row ringing four walls below the wooden ceiling of the Monastery Chapter House. The illustrious figures Figure 15. San Nicoló Chapter House with Tommaso fresco



dressed in similar dark brown cloaks over white habits are seated at large yellow desks surrounded by writing/reading materials, engaged—but isolated from each other—in some scholarly pursuit. As you will see from other of these wall portraits to be described further on, it is hard not to characterize this wonderful fresco as the most seminal artistic representation in the history of optics and literacy!



Gibbs (1989) posits that Isnardo's concave "reading glass" despite its bothersome "habit of reversing text" was used regularly as an important tool in the Middle Ages and Renaissance for enlarging small and faded handwriting (p. 85). Early Renaissance manuscript illuminations of other noted authors in scriptorium scenes give credence to this idea. For example, in an author portrait of the late 1400s (Figure 17), Dominican author Vincent of Beauvais (c. 1190-1264?) is shown composing

Figure 16. *Saint Isnardo* and detail of a medieval magnifying mirror



Figure 17. Detail of Beauvais composing and of his enlarging mirror



his book in a frontispiece of Speculum Historiale in his study. A concave mirror stands

prominently behind his slanted writing desk, suggesting (like Isnardo) that Vincent depended on the vision aid to magnify and reduce eyestrain as he wrote (see Footnote²). (Take note of the many other literacy artifacts, including bookshelves with highly decorated manuscript covers, scroll, page weights, and pen.)

Shortly after Isnardo's portrait, Tommaso (1352) painted another fresco on a column in the left nave of the attached Treviso Church of San Nicoló. Included in St. Jerome's writing paraphernalia was a unique type of mirror for magnification of letters—rarely seen today (Figure 18 and detail).

Figure 18. Jerome in His Study with horned shaped mirror detail



Above the book to the right is a small reading mirror in a horned-shaped leather case probably filled with sand for

balance. Ilardi (2008) said the mirror seems placed "at the right angle for focusing and enlarging letters" (p. 276) and argued that this is possibly the first depiction in Western



painting of a horn-shaped reading mirror.

Some 100 years later, in a remarkable painting by Niccolo Colantonio (active 1440-c. 1470) of Jerome (1445) amid his scholarly clutter, a much larger horned-shaped mirror (Figure 19 and detail) sits in the corner of his desk. Tommaso and Colantonio's two paintings are noteworthy because they begin the motif of using still life literacy

objects (books, writing equipment, etc. in niches) in a private intimate space to depict and identify a place of sacred learning.



Figure 19. *Jerome in His Study* and detail of horned-shaped mirror by Colantonio



Jerome's horn-shaped mirror is very similar to one pictured in a woodcut picturing standard calligraphy equipment for writers and scribes in the 1500s (Figure 20 and detail).

In his book Libro nuovo d'imparare a scrivere (A New

Book for Learning to Write) originally published in 1540, Giovanni Battista (Giambattista) Palatino (c.1515-c.1575) extoled the virtues of mirrors. After discussing various tools of a scrivener including a compass, square, ruler, scissors, string, seal, he declared "the mirror is used to save the sight and to assist it in continuous steady writing. It is much better of glass than of steel." (as cited in Frugoni, 2003, p. 7; Ilardi, 2007, p. 45). Noteworthy to this discussion on early vision enhancement is the chapter that Palatino included on mirror writing (Mellby, 2008). Indications are that by the 16th century mirrors were "almost obligatory in the study" and that their literacy related application gradually declined "with the common use of optical lenses and spectacles" (Thornton, 1997, p. 168). Figure 20. Standard calligraphy equipment and detail of horn mirror (1540)



Reading Stones

As the beryl enlarges writing to read in it... It grows high, broad, wide and also long. (Albrecht von Scharfenberg, 1270, as cited in Andressen, 1998, p. 12)

It (i.e. the crystal) has in it such great powers That be writing ever so small, It looks larger in it; If this stone thought about it and encroached If someone ground it thin and wanted to hold it on the writing, he would see through it the little letters look bigger. (Konrad of Wurzburg, 1270, as cited in Andressen, 1998, p. 12)

Prior to water globes and mirrors, many experts argue that the first reading aids used by the ancients to improve sight were actually clear natural pebbles, referred to as *reading stones*. Also called, *magnifying stones*, these transparent rocks made from rock crystal, quartz or beryl, were our first simple magnifiers. Generally flat on one side and strongly convex on the other (called plano-convex), they were laid flat-side down directly onto the letters to enlarge them, as in this example owned by the Zeiss Optical Museum in Oberkochen, Germany (Figure 21).

Figure 21. Reading Stone



Literacy sources describing the use of stone readers are scarce. The oldest extant reference was by Aristophanes, a Greek playwright and a contemporary of Plato and

Figure 22. Modern dome magnoilluminator



Socrates in 427 BCE who mentioned the use of a fine transparent stone with which fires are kindled and writing is melted away on wax tablets (Rosenthal, 1996, p. 389). Alhazen (956-1039) gave a description of "spherical glass segment used to correct defective vision" (Daxecker, 1997, p. 177). The next written references were in the mid-13th century in the two German poems (see above). However, there is widespread archeological evidence as far back as the Bronze Age of hundreds of highly polished plano-convex lens suitable for reading and other close

work—from ancient Egypt, to Troy, Crete, Assyria, Germany and Scandinavia. Often these objects have been or are hidden away in museums, never analyzed for optical properties and mistakenly labeled as jewelry or decorative objects (Enoch, 2007; Ilardi, 2007; Rosenthal, 1996; Temple, 2000; Willach, 2008).

A direct descendant of the reading stone is the modern paperweight or dome magnifier that both magnifies and gathers in light for crisper, brighter reading. Contemporary readers use this *magno-illuminator* in the same way as the early reading stone (i.e. placing it directly over the text); however, instead of a rock crystal, quartz or beryl, the dome is made of glass or acrylic. Figure 22 is one such example.

Temple (2000) identifies one of the Sloane lens in the Natural History Museum, London, as a remarkable example of an ancient reading stone that is a magnoilluminator. Made of rock crystal, the lens has a domed top that is completely transparent. In a dim room the illumination is doubled on the portion of the text one is reading simply by placing the lens upon the print and; the print is enlarged 2 ½ to 3 times as shown in Figure 23.





A rare depiction of reading stones was painted by Ludwig Konraiter at Innsbruck, Austria in a gothic altarpiece showing scenes of the life of St. Mary and St. Ursula (1485–1490) (Figure 24 and detail). On the far right among 10 women saints, Saint Ottilia is looking down at two reading stones resting on an open book. Konraiter cleverly depicted how the two reading stones placed on each page of the book magnify the words underneath. This may well be the oldest painting of a woman reading with *any optical device*.

Saint Ottilia (Odilia) of Alsace (660-c. 720 CE) was an Abbess who was born blind and miraculously regained her vision when baptized as an infant. Consequently, the Catholic Church named her the patron saint of sufferers of eye disease—celebrating her on December 13th. Most representations of Ottilia show her holding a book with actual

eyeballs as in this 1506 painting by Cranch at the National Gallery in London (Figure 25). As a well educated and learned Benedictine nun, her attribute is a book with eyeballs to signify her restored sight.

Figure 24. *Scene in the Life of St. Mary and Ursula* and detail of St. Ottilia with two reading stones on a book.





Figure 25. *Saints Christina and Ottilia* detail with eyeballs



Single Lens Reading Glasses

Pragmatically, stone readers were not very ideal for writing because they had to be placed on the text to enlarge it; and for the most part, were so strong (often 10-40 diopters) that they were of limited help to those suffering from poor vision (i.e., presbyopia, hyperopia and myopia).

However, from the

Dioptric Correction vs. Magnification

A diopter (D) is a metric measure of the refractive power of a lens. People with myopia use concave lens with negative diopter values (generally -1.25 to -3.00 D), while those with hyperopia use convex lens with positive values (+1.25 to +3.0 D) to correct refractive errors and make letters more readable.

On the other hand, a good magnifying lens works on a different optical principle, being only convex and much stronger, generally with a diopter measure of +10 or more. Magnifiers bend the light to make things *appear* closer and larger. For the most part, reading stones were in the range of +10 to +40 D.

A *dioptrical corrective lens* (Willach, 2008) functions like spectacles and is held close to the eye to correct the wrong focal length of the eye lens, while magnifying lens held closer to the text just enlarges the actual dimensions of the text. Allowing for artistic license, the position of the lens to the eye relative to the text in art images allow educated guesses as to what type of vision aid the tool might be.

Side Bar 2

ancient world, we have archeological evidence that man discovered how to improve the optical quality of these crude powerful quartz stones by making them thinner, weaker and slightly convex, suitable for magnification or dioptrical correction (see *Side Bar 2*). Willach hypothesized (2008) that through the Middle Ages, the ancient art of stone grinding and polishing technology continued to be refined but, for the most part, only in monastery workshops.

These thinly honed rock-crystals (and later glass) discs became seen as precious objects and used for secular and religious ornamentation. As early as the 8th century CE, lenslike transparent objects were used to decorate liturgical art objects (like crosses, manuscript book covers, etc.) and for protective coverings of sacred relics of various saints or martyrs (i.e., holy cross splinters, bones, etc. from the crusades) in what were called *plate-reliquaries*. Figure 26 shows one such example, a wooden German Table Reliquary (1220-1225) with 12 windows displaying various labeled relics. Making a replica of the slightly convex rock-crystal disc of window #4 (Figure 26 detail), Willach (2008, pp. 21-25) effectively demonstrated that with this lens, text was quite clear and readable for a presbyopic eye of +4.2 diopter at a distance of 25 cm.



Figure 26. Table reliquary and detail of window # 4



Likely discovering that these clear, thin discs could improve sight during the grinding, polishing and finishing process of ornamentation or reliquary windows, some inventive monk or artisan shaped a wooden

frame and handle for the lens to be held in front of the eye for ease of reading and writing in the scriptoriums—effectively extending the literacy life of monastery scholars, manuscript

illuminators, scribes and copyists. Presto! We had our first single lens corrective reading aid. Amazingly, this stemmed monocular has gone in and out of fashion, but not out of use for the last 750 years!

The earliest known depiction of a single dioptrical vision aid (c. 1260) is on a sculpture of painted sandstone at the St. Maurice's in Konstanz (Constance), Germany (Figure 27) (World Lingo, 2011). On the interior of the 12 sided *Holy Sepulcher* representing the





Figure 27. Mauritus Rotunda, Konstanz, Germany

Figure 28. Pharmacist holding single dioptrical lens or trowel? (c. 1260) sacred grave of Christ, is a scene of three women buying ointment for embalming Jesus from a pharmacist who holds in his left hand a lens with a stem (Figure 28). The lens is only slightly curved and not highly convex, suggesting it is not a reading stone, but instead a reading lens held to the eye to correct the vision of the farsighted and aged. Some scholars believe this figure may be the Greek Hippocrates, the famous physician of Antiquity, pictured with his reading glass as "a symbol of wisdom and age" (Willach, 2008, p. 25). Others like Fleishman think the object he holds is actually a pharmacist's trowel (see Footnote ³)

In the very same amazing San Nicoló, Treviso fresco that included a representation of a magnifying mirror (Figure 16) by Tommaso da Modena in 1352, we find the *earliest extant painting of a single reading lens* on the southern wall. Aging Cardinal Nicholas of Rouen (Figure 29) holds a stemmed lens made of rock crystal close to his eye as he strains to see the page of a book. The position of the lens suggests that it is a corrective tool, not a magnifier.









The second oldest painting (Figure 30) of a single lens reading aid is another fresco by Andrea dei Bartoli (c. 1349-1369) a contemporary of Tommaso, in Cardinal Albornoz's Burial Chapel at Assisi (1367-69). In the lower left of a larger scene depicting St. Catherine debating the philosophers, two learned men consult an open book, one with a stemmed corrective lens (like Rouen) held close to his eye for either presbyopia or hyperopia issues.

Literates with myopia, on the other hand, had to wait almost 150 years before their sight could be improved with a concave lens. Nicholas of Cusa (1401-1464) a German theologian, philosopher

and scientist was the first to use concave lenses to correct nearsightedness in 1451. In one of his greatest masterpieces, Raphael (1483-1520) painted the first known portrait of a person using a single bi-concave lens to compensate for myopia in 1518.

Figure 31. Myopic Pope and detail of his concave single reading lens



Figure 31 depicts Pope Leo X of the Medici Family (1475-1521) known for severe myopia (-12 diopters) holding an elegant stemmed bi-concave lens as he studies an illuminated manuscript. Flanking, but not interacting with the Holy Father are two of his

Myopia Mystique

In the West, Hyman (2007) found myopia was only connected to a relatively small portion of our population (20-25 % of adults with eye problems). However amazingly, it seems to affect a very high percentage of creative people.

Many of our greatest poets and writers were nearsighted including Milton, Goethe, Keats, James Joyce and Edward Lear. Famous myopic musicians included Bach, Beethoven, Schubert and Wagner. Intriguingly, a number of our most revered painters were believed to be shortsighted: Blake, Degas, Cezanne and possibly Van Eyck, Durer, and Vermeer. (Macfarlane & Martin, 2002; Marmor & Ravin, 2009)

Side Bar 3

cousins, Cardinals Luigi de' Rossi and Giulio de Medici. The famous portrait is rich in details, including a bell (symbolizing power) and the 14th century "*Hamilton Bible* (now at Berlin Staatliche Museum) open to the first verse of the Gospel of John: 'In the beginning there was the word'"(Beyer, 2003, p. 146).

Later, Jacope da Empoli (1551-1641) captured the very same Pope in the act of actually reading with his single concave lens (Figure 32). As Michelangelo presents his model of San Lorenzo, the Pope holds the handled single concave lens in his left hand closer to his eye as he digests the distant material lying on the table

Figure 32. Pope Leo reading with his concave lens



(1617). (See *Side Bar 3* for more information on myopia.)

Quizzers

Although still with a handle, a distinctly different form of single lens achieved great popularity in the 1700s to mid-1800s. Called a *Quizzing Glass* or the more common name, *Quizzer*, this aid was particularly in vogue in Western Europe with both genders (Corson, 1967; Rosenthal, 1996). The name came from the practice of holding the glass

"up to the eye "to 'quiz' (stare, glance, look at quizzically) people and objects. "The wearer would sometimes glare at a person through his or her quizzing glass as a manner of set-down or mockery..." (Hern, 2004).

Quizzing glasses had long or short handles and were different from the monocular seen so far in that they were smaller, had loops at the end of the handle, and glass set in a thinner metal frame, although the earliest ones were made of wood. The glass was first in the form of plain small round lens but later manufactured in oval, oblong and square shapes. The loops were for holding by hand or attaching a chord to suspend the glass around the neck (Figure 33). Figure 33. Examples of quizzers



Figure 34. A quizzer caricature by I. R. and G. Cruikshank (1830)



Quizzing glasses were primarily a grand public fashion statement! Often highly ornamented, both women and men used them as jewelry or accessories. Foppish young men brandished them for effect, loving to posture, gesture and even caressing the quizzers—great fodder for caricatures of that time (Figure 34). The upshot of closing one eye as one looked through the lens held close to the socket was an air of snobbishness or hubris.

However, quizzing glasses also were taken seriously as an aid to reading. Most single lenses were convex simple magnifiers, although some were set with corrective lens (for hyperopia and presbyopia) for those who did not like to be seen with spectacles outside the home (Corson, 1967; Hern, 2004; Rosenthal, 1996). By their nature (i.e., hand-held), quizzing glasses were best adapted for *casual reading* as opposed to serious *extended reading;* however, some paintings suggest that wearers did read with them for protracted periods of times. The practice of wearing quizzers as a pendant around the neck allowed for handy access while reading or doing close work—a forerunner of the contemporary habit of hanging reading glasses on chains or chords. Some quizzers even had handles with swivel-mounts so that they could hang flat against the body when not in use.

That the quizzer was often the preferred vision aid is indicated by portraits of writers, artists and prominent men of the time sporting the little stemmed glass disks. Paintings

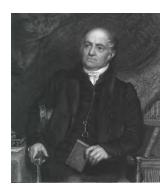
attest to the role quizzers played as serious literary artifacts and also of their popularity or status among the educated or artistic communities.

For instance, French painter Theodore Rousseau (1812-1867) evidently must have considered a quizzing glass

Figure 35. *Theodore Rousseau*



draped like a watch across his stomach (1850) a suitable statement concerning his choice of a vision aid (Figure 35). Olinthus Gilbert Gregory (1774-1841) (English mathematician, Figure 36. *Olinthus Gilbert Gregory* with quizzer



teacher, author and editor) was painted in 1835 (Figure 36) with a quizzing glass, hanging prominently against his vest above the closed

book in his left hand—leaving little doubt that the visual aid played an important part in maintaining his scholarship at his advancing age of 61.



The women were not left out of the quizzing picture, so to speak, with several painted caricatures as well as portraits featuring the single lens in hand. Although meant as a fashion statement "A Lady in a Levantine Hat" (1797) actually seems to poke fun at both the quizzer and

the woman as a reader (Figure 37). Elegantly poised in her puffy hat with an open book in one hand and the little lens in the other, this young lady is strutting!

The most stunning and elegant painting I have

found of a quizzing glass is a portrait of Madame Marcotte de Sainte-Marie (1826), a family friend of the painter Ingres (Figure 38). "Dressed to the nines" in brown satin and resting on a gold couch, Mrs. Marcotte has a very fancy chain around her neck attached to a lens that she delicately holds as she looks up from her reading.

Single Lens Challenges

The single lens could not have been that easy to use in sustained and concentrated reading and writing. The challenges were many-fold:

- The hand holding the lens got tired and shook,
- Print wavered and jumped around,
- One eye had to be closed for better focus (a difficult feat for some people),
- The number of words taken in by the eye was limited and eyestrain common; and
- With one hand occupied, holding a page securely, writing or cradling a book while turning pages at the same time was difficult.

Side Bar 4



Figure 38. *Madame Marcotte de Sainte-Marie* and detail of her quizzing glass



The Geography Lesson (before 1785) by Longhi is a particularly intriguing painting because of the different interpretations of the use of the quizzers that it garners (Figure 39). Is the instructor holding up the lens to stare or look quizzically at his young female student; is he actually showing his disapproval or setting her down for a wrong answer

Figure 39. Geography Lesson



(another common use of the lens in public); or, is he more interested in the beautiful student than deemed appropriate?

Monocles

Reading and writing with a stemmed monocular for any length of time was demanding (see *Side Bar 4*). In the 18th century, several new technologies ingeniously solved the challenges of holding a single lens to do close work. The evolution of the relatively rare *head monocles* and the wildly popular *eye rings* (the modern monocle) were a boon to literates in stabilizing the reading lens and freeing both hands.

One such contraption circling the forehead held a single lens suspended over one eye as in Figure 40.

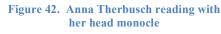
Figure 40. Forehead single lens

Figure 41. Therbusch's Spina-Frontalis monocle





A woman artist (and an avid reader as well) became infamous for picturing herself wearing a leather or metal strap variation that wrapped over her head and secured under a headdress (Figure 41). Several self-portraits (including Figures 41-42) of Anna Dorethea Therbusch (1721-1783) shows the painter with an open book, as she looks up from reading—the large convex lens called a *spina-frontalis-monocle* hanging over her right





eye. Ilardi (2007) pointed out that "a myope using this contraption with a negative lens could have used the monocle for distance and the unaided eye for close work" (p. 299).

Therbusch (1721-1782) was an accomplished German painter of Polish decent and among other appointments, served as painter to the court of the Empress of Russia and to King Frederick II of Prussia. In all likelihood Therbusch (55 years old at the time) was suffering from presbyopia and used the lens for painting as well as reading and her other eye for distance. Her vision enhancement is analogues to today's *monovision* technique of one contact lens for near vision on one eye and, if needed, a lens for distance vision on the other eye.

First called an *Eye Ring*, the monocle was by far the most popular uniocular vision instrument to develop.

Thought to have evolved from quizzers (Davidson & MacGregor, 2002), the glass stem was shortened to a simple loop of metal around a circular lens. By considerably reducing the weight, the practiced user could grip the lens "by squeezing the orbicularis muscle" (Holtmann, 1980, p. xv).

The original modern monocle surfaced around 1720s, when German Baron Philip Von Stosch (1691-1757) first introduced the single lens with a string, primarily "for near vision (like reading) and to balance the weaker eye with the good one" (Holtmann, 1980, p. xv). However, the golden era of monocle use (as well as artist's rendering of them) did not occur until the 1880s through the early 1900s. Monocles were commonly used as status symbols and fashion statements by privileged males (Fleishman, 2011).

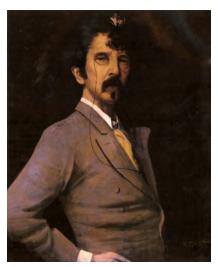
Often made fun of and derided for their foolishness and possible detrimental effect to one's vision, monocles were usually round, but were manufactured in a profusion of other shapes (rectangle, oval, square) with various metals for the frames. Square monocles held in the eye may have been even more fashionable in Paris in mid 1800s than round ones (see Corson, 1967, p. 118-119), as seen in this 1857 caricature (Figure 43) by Claude Monet (1840-1926).

When they were not mere window glass for fashion effect, the aid functioned as an effective dioptrical lens. The wearer may have carried two monocles, one for distance and the other for reading (Rosenthal, 1996). Advances in optometry allowed Figure 43. Young man with a square monocle



better measurement of refractive error in the early 1900s so that monocles could actually be prescribed individually with different strengths—thus becoming a better corrective device.

Figure 44. Whistler's monocle



Paintings of monocle wearers underscore their popularity, particularly in England and Germany, both a hotbed of foppish and serious wearers. Well known artists, politicians, and poets of the time (as in Figures 44-47) were often seen be-monocled.

The corrective aid worn by the English painter James McNeill Whistler (1834-1903) is a prominent feature of several portraits done of him (Figure 44). The glass is as much a part of Whistler as his thick

horseshoe mustache. Like Anna Therbusch, as a consummate user of monocles, he probably donned the lens for close painting as well as reading. This is a man with attitude!

The numerous paintings of English politician Joseph Chamberlain (1836-1914) with monocle and surrounded by books and papers made a clear testimony about his intellectual life and preference for reading aids. Figure 45 is one such portrait by Sargent done in 1896. Figure 45. Chamberlain in his study



Figure 46. Myopic Tennyson at Cambridge



Like some of our greatest poets, Tennyson (1809-1892) was myopic as confirmed in an early pencil drawing by his friend James Spedding (1808-1881) when they were together at Cambridge in 1831 (Figure 46). Sir Alfred Lord Tennyson, Poet Laureate, is the second most frequently quoted writer in *The Oxford* Dictionary of Quotations after Shakespeare. While no painted portraits exist showing Tennyson with a vision aid, several photographs indicate

Figure 47. Tennyson reading with a monocle



that he was a serious user of the modern monocle-

probably to correct his near-sightedness (Figure 47).

As for a German example, Karl Marx (1818-1883) could not be more appropriate. In numerous photographs, prints, and paintings, his monocle is ubiquitous hanging prominently against his chest. Basically tainted with their German association, monocles fell into disrepute, particularly after WWI and WWII. Paintings that depicted the monocle as a symbol of German authority, contempt for humankind and domination associated with the Nazi war machine are seen in Figures 49 and 50.

Figure 48. *Karl Marx* 1875



Figure 49. WWI German monocle



Figure 50. WWII German monocle



The Mighty Magnifier

In one of the earliest of Edgar Degas's (1834-1917) many café scenes, two men are seated at a table, examining what appears to be a newspaper; the man on the right holds a magnifying glass half way between his eye and the paper and his companion wears a monocle. *Café Charteaudun* (1869) leads us to conclude that monocles and simple magnifying glasses were still in fashion and used concurrently for reading by well-off, over-40 males at the mid-to-late 19th century France (Figure 51).

Interestingly, of all the monocular vision aids, the most enduring (spanning the centuries from antiquity to contemporary times) has been the *mighty magnifier* (see Footnote ⁴). Of course, the oldest vision aids were the first simple magnifiers, reading stones. Their Figure 51. At the Café Châteaudun



descendants, the "utilitarian (magnifying) reading glasses with handles have been used with astonishingly little change since the 13th century" (Corson, 1967, p. 81) (see Footnote ⁵). Two variations of the simple magnifiers are worth noting because of their appearance in paintings and their practical use in enlarging text, even today.

Pocket Magnifiers. Since straight handled magnifiers were too unwieldy to be portable, one transformation since the 13th century was the development of small round compact *pocket magnifier*. By the 1600s, small magnifiers were treated as valuable items, so much so they had cases to keep them safe and unscratched. By the end of the 18th century, the lenses were made to rotate in and out of attached protective cases (Davidson & MacGregor, 2002), making this compact mobile aid quite handy and gave ready access to magnification needs. Today the folding pocket magnifiers are still very much in demand coming in similar shapes and sizes, some even with illumination.



Figure 52. The Abbot Thomas Valperga with his pocket magnifier and case



In Figure 52 and detail, see how the "simple magnifier (obviously meant for reading) rotates into a decorative metal case that is likely to be silver" (Fleishman, 2011). This 1802 elegant portrait is of Abbot Thomas Valperga of Caluso (1737-1815) by Francois Fabre (1766-1837).

Six Inch Reading Glass. At the other end of the spectrum, perhaps the mother of all personal monocular magnifying aids was the *Reading Glass*. Also referred to as a gallery or a library glass, the distinct optical form was popular during the 1700s to late 1800s and like the pocket magnifier, is still used today. While smaller, earlier magnifiers had shorter focal lengths, the reading glass was a convex lens of a large diameter (usually about 6 inches), a long focal length of more than ten inches and modest power, designed

Figure 54. Close Scrutiny by Klausner



to be held a few inches from the text. Importantly, these reading glasses allowed use of not one but *both* of the reader's eyes to see the words, essentially solving a problem of much smaller magnifiers.

In a still life painting detail (Figure 53), Charles Spencelavh (1865-1958) captures the essence of the reading glass as it rests on an open tome ready to be put to work in deciphering the mysteries of the book. Suggestive of what it means to be a consummate reader, the work is entitled *Fingerprints*.

Figure 53. Fingerprints by Spencelayh

http://www.russellcotesarts hop.co.uk/artist/7283/Charl es Spencelayh

The end of the 19th century brought wonderful

examples of narrative paintings with the reading glass in use, particularly by aging male scholars. This gray-haired cardinal surrounded by his scattered books and scholarly accruements, leans intently over a document with his large reading glass in this work (Figure 54) entitled Close Figure 55. Dr. Paul Gachet with his

Scrutiny by R. Klausner.

spectacles and reading glass

As with monocles and magnifiers (see Figure 51), other paintings of the late 1800s showed readers preferring several different viewing options when print clearly presented a challenge. Van Gogh's doctor, Paul Gachet (1829-1909) is pictured in Figure 55 with a large reading glass beside a book upon which rests some dark rimmed spectacles. The artifacts in the portrait conjure up a picture of a learned, aged, educated man with poor eyesight who seriously loved to read, even the fine print!

One of my favorite depictions of two vision aids is in a 1927 painting by Norman Rockwell (1894-1978). A gentleman, somewhat advanced in years, wants so badly to read the tiny, blurred text that he enlists a



large reading glass and his spectacles *simultaneously* to get the gist. Entitled A Book of *Romance*, the picture is sad and funny at the same time with the very proper old man, donned with a top hat, finding love vicariously through books while young love blooms in the next room. Note how Rockwell makes the room so thick with literacy that shelves, desk, chairs and floor overflow with reading material.

Figure 56. *Book of Romance* by Norman Rockwell http://collection.nrm.org/search.do?id=229832&db=o bject&view=full

In sum, the single lens has been an extraordinarily resilient vision aid, supporting literacy for more than 750 years. Until spectacles took off, they were the primary vision tool for reading and writing—and then held their own as a viable alternative to improving the poor vision of text. Monocular technology, as well as the plural modern nomenclature (*a pair of glasses* or *spectacles* to mean *one* vision tool with *two lenses*), give hints as to the next step in the extraordinarily protracted development of eyewear. Now on to the intriguing story of what, in the service of literacy, may be the most important invention in the last 2000 years.

Double Lens Eyeglasses

While single lens technology was important to better vision (of text and otherwise), double lens eyeglasses were—from their inception—*all about literacy*!

Three quotes nicely illustrated the staggering importance of spectacles for readers and writers:

Spectacles have effectively doubled the active life of everyone who reads...preventing the world being ruled by people under 40. (Attributed to Nicholas Humphrey as cited in Ilardi, 2007, p. 3).

To men who were literate but were condemned to blurry vision never again to read, such a device must have seemed an unbelievable reprieve, a gift from God.... To no one, evidently, did it occur that [spectacles would]...help shape the course of history! (Corson, 1967, p. 9)

The art of making a pair of spectacles was an achievement of monumental significance for mankind that has had an incalculable impact. Although it has been relatively unknown to the general public, the evolution and development of spectacles over the past seven centuries qualifies as a long, significant, and quite fascinating journey through history, whose impact deserves to be better recognized and more widely appreciated. (Spencer Discala in Fleishman, 2011a)

The invention of eyeglasses is a real historical "who done it." As Vasco Ronchi so aptly put it, "the world has found lenses on its nose without knowing whom to thank" (as cited in Rosen, 1956, p. 13).

With misconceptions and questionable verisimilitude, historians have proposed various hypotheses as to how and when spectacles actually came to be (see Corson (1967);

Fleishman (2011); Ilardi (2007); Holtmann (1980); Rosen (1956); Rosenthal (1996); and Willach (2008). Although the true account is shrouded in historical mire, academics do seem to agree on five major points:

- We have the Italians to thank for the invention of reading spectacles around 1285, probably in Florence, Pisa or Venice. Fleishman (2011a) argues that the evidence comes down on the side of Pisa as the first place a primitive form of eyeglasses appeared, but Willach (2008) contends it is Venice because the first extant written evidence of spectacle development is a set of Venetian crystal-glass craftsmen's regulations in 1300 and 1301 linking glass lens directly with literacy manufacturing both "round disks for the eyes...and reading stones" and specifically "glasses for the eyes for reading" (pp. 35-36).
- 2. We also have the Roman Catholic Church to thank for spectacles' evolution and distribution. We can only guess how big a role lay artisan glassblowers and gemsmiths played in the actual inception of spectacles. However, if not directly created by monks, the innovation was certainly associated with industrious clerics who made significant contributions to the theory, development and dissemination of spectacles. "Had it not been for missionaries, man might have waited several hundred more years for this marvelous invention...." (Muth, c. 1995, as cited in Fleishman, 2011b).
- 3. *Thus, monasteries were the place to be* if you had an eye problem. Whether monks with poor eyesight were the impetus for spectacles' development, the actual inventors or just the lucky recipients of the technology, clerics with presbyopia and/or hyperopia (particularly writers, illuminists, copyists, and scholars in monastic scriptoriums) were the ones who significantly benefited.
- 4. Clearly optical theory lagged behind actual practice. As Ilardi (2007) concluded, "the invention did not result from the application of sound theoretical principles" (p. 28, Footnote 72). Skilled artisan monks used grinding and polishing techniques known in antiquity, well before theorists like Franciscan Bishop of Lincoln, Robert Grosseteste (c. 1175-1253) and friar Roger Bacon (1214-1294) first set forth a rationale and practical application of optics, vision correction and magnification. They attempted to explain (albeit, incorrectly) why simple magnifiers like reading stones and water filled globes worked to help people read and write (see *De Iride* by Grosseteste, 1220-1235, and *Opus Major* by Bacon, 1268). Accurate modern optical theory did not begin until Johannes Kepler's work in the 17th century.
- 5. And finally, with precious little early archeological evidence and few written documents, art works —particularly paintings—have been critical in the identification and dating of vision aids. Eminent optical scholars like Fleishman (2011); Ilardi (2007); Poulet (1980); and Rosenthal (1996) have followed the lead of ophthalmologist Richard Greeff and colleagues (1929) in the extensive cataloguing of hundreds of public and private works of art that began associating spectacles anachronistically with famous Catholic saints and Old and New Testament figures in the 1300s. For, as Greeff, et al. (p. 189) said:

If we want to occupy ourselves with the history of the (sic.) spectacles, we cannot do without the works on representative art. (as cited in Ilardi, 2007, p. 261)

Another issue on which historians agree is that for over 700 years multiple problems have plagued the design of spectacles, including difficulties in making dioptric lenses for a wide range of vision problems and efficacious frames to hold the lenses. Contemporary optical specialists are still trying to find an efficient solution for maneuvering between the three "reading" distances of close, far, and mid-range vision (see Footnote ⁶). Construction of frames has been a particularly hard and protracted problem historically because of the awkward nature of fitting glasses to the head. Innovations to keep the glasses attached and stabilized on the face and in the correct position in front of the eyes to read took hundreds of years to evolve. "Spectacles frames have been one of technology's best examples of poor engineering" (Drewey, 2007).

In a nutshell, the evolution of double lens frame technology goes like this://

- 1. On the *nose*,
- 2. On the *temple*, and
- 3. Over the *ears!*

Nose-Fitting Spectacles

The most fascinating of all the spectacles is the first one ever invented—the *rivet*. Some pioneering monk or craftsman thought to rivet together two hand-held crude single lenses incased in wooden frames with handles turned upside-down to form an inverted V. The earliest evidence we have of rivet spectacles are in paintings of Dominican monks by Italian artists just north of Venice in the mid 1300s.

Rivet Spectacles

Rivet nail eyeglasses (made to perch on noses) were in continuous use for approximately 300 years from 1285-1550, an extraordinarily long time. The original frames were made of wood and bone.

Figure 57. Nuns' Choir at Wienhausen Abbey, Germany



Ironically, the world's oldest surviving pairs of eyeglasses were not found in Italy, but instead in Germany. In fact archeologically, almost all of the extant pairs unearthed so far are from Northern Europe and only one bone pair has been found in Italy, home of the spectacle (Fleishman, 2011c) (see Footnote⁷).

The earliest riveted spectacles (c. 1330) that we have to date were found 160 miles south of Hamburg in 1953. Renovators found a cache of optics beneath the flooring of a seating area reserved for nuns attending

mass (called a *nuns' choir*) at Wienhausen Abbey Convent, Germany (Figure 57). Among an array of 1000 objects (including glass cases, spectacle fragments and four later-dated leather spectacles) were several intact pairs of rivets representing three distinct types. To say the least, this was a stroke of luck for the history of spectacles (Figure 58)! Made of wood and thin glass plano-convex lens of +3 to +3.9 D, the rivet spectacles were probably discarded in a 1310-1330 renovation. (College of Optometrists, 2011; Fleishman, 2011c; Willach, 2008).

From left to right in Figure 58, Rivet type 1 had a straight stem; type 2, a curved stem; and type 3, more of a flatter bridge with lens between two layers. Type 1 and 2 had threads to tie the frame together whereas type 3 used 2 pieces of wood glued together (see Fleishman, 2011b for a detailed description of each design).

Figure 58. Three designs of rivet spectacles: Type 1, type 2 and type 3



Amazingly, the first extant depiction of a woman wearing glasses and possibly the earliest figurative representation of any type of spectacles is at the Church of St. Martin, Salisbury, England. While the date is controversial, it could be as early as 1330 or as late as 1430-40 (College of Optometrists, 2011; Fleishman, 2011c). On an ornamented corbel (a piece of stone jutting out of a wall to give some kind of architectural support popular in early medieval buildings) is a nun wearing rivet 1 type spectacles. The artist even simulated her pupils in the middle of the lenses (Figure 59).



Figure 59. Salisbury nun corbel with rivet type 1 spectacles (1330/1430) and detail



The long shafts of the stems brought the rivet juncture far above the nose bridge and between the nun's eyebrows resulting in the lens resting directly over her eyes. However, because they are not anchored to the face, it is doubtful the Salisbury sister kept the spectacles on her head for very long when she bent over to read (see Footnote⁸)!

While a boon to the sight of aging erudite monks and possibly nuns (see *Side Bar 5* and Footnote ⁹), the way rivet types were constructed precluded the practice of reading and close work for extended periods of time. Stiff, rigid, heavy and very unsteady, rivets were difficult to keep on the face, although they were meant to rest independently on the nose to free the hands. As seen in the next section, artists have pictured an intriguing range of reading behaviors that spoke to these problems— including *forefinger* pinches, balancing acts, inverted and one-eyed squints.

Forefinger Rivets. Inevitably negating the advantage of handsfree reading and writing, literates resorted to grasping the glasses by the thumb and forefinger and pressing them to the face. Figure 60 demonstrates the forehead press from the top and Figure 62, the frame grip from the side as a means of keeping a lens directly in front of each eye.

Bespectacled Women

I find it intriguing that the oldest archeological examples of rivet spectacles (Figure 58) and possibly the earliest figurative spectacle representation (Figure 59) were associated with *women in convents* during the High Middle Ages. Could this evidence, indeed, point to regular reading and writing with spectacles by aging nuns?

Clearly literacy, as well as spectacles, was a male prerogative in the Middle Ages. Written records give very little indication that medieval females availed themselves of glasses. The only mention of a woman using spectacles (that I could find) was St. Francesca Bussa (1384-1440) who is said to have "read devotional books with eyeglasses" (Ilardi, 2007, p. 170).

However, other documents suggest that literacy was more widespread in medieval nunneries than initially thought. A number of sources starting from late antiquity describe convents (often founded by literate aristocratic women) as restricted communities for female refuge, study, and education. Theses sisters followed similar reading rules as their monastic brethren. Female orders such as the Dominicans were reported to be almost all literate. Particularly noteworthy in Germany from the 11th and 12th centuries, were a group of erudite abbesses who were authors, scribes and manuscript illuminators (Avrin, 1991; Fischer, 2003; Kellsey, 1999). Would not aging female writers have the same vision problems as their male counterparts?

Like written sources, art, for the most part is silent as to nuns' use of spectacles, until into the Renaissance. Not one woman saint has been painted actually wearing glasses, even the two Patron Saints of Poor Eyesight, Ottilia and St Lucy. In an authoritative survey by Poulet (1980), only 9 % of artistic works representing eyeglasses through 1850 are associated with women. Not until the mid-1600s did painters begin depicting bespectacled females reading—Lievens and Rembrandt being two of the first artists to do so in the 1620s (see Figures 80 and 81).

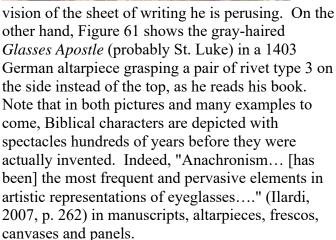
Side Bar 5

Figure 60. Zebedee with rivet 1 type spectacles



In *Relatives of St Anne* (end of 15th century) Zebedee (Figure 60), the father of disciples James and John, holds the joint of a rivet 1 type by his thumb and forefingers up by his cap —a quite taxing position to sustain. The dioptrical lenses are positioned in front of his eyes for better

Figure 61. *Glasses Apostle* with rivet type 3 spectacles





Nose-Placed Rivets. By far the most common literacy practice was balancing the heavy rivets on the bony bridge or lower fleshy parts of the nostrils while tilting the head downward to read or write. Of the paintings that I have found pairing rivet spectacles with literacy activities, 77% (78/101) of represented glasses were situated independently on the nose in this manner.

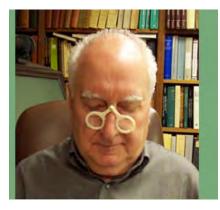
The most famous painting of this reading behavior is of Cardinal Hugh de Saint Cher (Figure 62) in the 1352 Tommaso fresco at the San Nicoló Monastery. Across the room from St. Isnardo and his magnifying mirror (Figure 16), St. Cher's image reading in his cell with spectacles (Figure 62 and detail) is most remarkable for a number of reasons: it (a) represents the earliest painting of the first spectacles that we have; (b) suggests that in the mid-1300s, scholars, indeed, had a choice of 3 different types of vision aids (single lens, mirrors and double lens); (c) implies that within the culture, painters saw spectacles as important symbols of scholarship and learning; and consequently (d) sparks the beginning of *anachronistically* depicting scholars or saints with eyeglasses. Cardinal Hugh de Saint Cher could not have used spectacles because he died 22 years before glasses were invented!



Figure 62. *Cardinal Hugh de Saint Cher* writing in his cell and spectacle detail (the earliest painting of reading glasses).



Figure 63. Dr. Vincent Ilardi wearing rivet type 1 spectacles



One

consequence of resting the hinge on the top of the nose is that the readers have to direct their gaze downward considerably because the lens are at the level of the cheeks. Figure 63 shows antique spectacle historian, Professor Vincent Ilardi (1925-2009) wearing a replica of type 1 rivet glasses in much the same manner as Hugh did some 700 years earlier.

Inverted Rivets. An illumination from an Italian choir book at the Convento di San Marco in Florence (mid 14th century about the same time as Hugh's portrait in 1352), illustrates another interesting early rivet use, as well the common medieval textual practice (Figure 64) of group *shared reading*. A choir of tonsured monks is chanting from a large book on a slanted lectern. One grasps a double lens with a rivet from *below* like a scissors instead of from the top—an arm position much easier to sustain than Zebedee's in Figure 60.

Figure 64. Monk holding inverted rivet spectacles

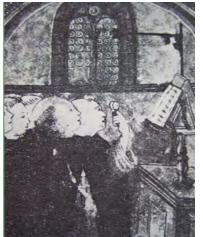




Figure 65. Shared reading and detail of a singer with rivet spectacles



The image of the monks in Figure 64 also speaks to the issue of *text size* as an important consideration for aging monks participating in and/or conducting public religious services (see *Side Bar 6*). Typical of religious choirs of this time period, a large group of

members shared one extra-sized manuscript positioned on a lectern (seen also in Figure 65). The parchment was "thick and strong enough to withstand leaning against a slanted support and being held with sash weights on a daily basis" (Boehm, 1994, p. 20). In Figure 65 and detail, a 15th century Italian miniature by Strozzi, a tall man on the far top left is wearing rivet spectacles, probably with concave lenses to help him read the extra large choral script at a distance.

Monocular Rivets. In several examples, painters portrayed older men engaged in the curious practice of using only one rivet lens instead of two. Figures 66 and 67 depict each reader humorously clutching the left spectacle lens to his face, ostensibly using the right side as a single lens. The first

The Bigger the Better!

We can only guess at what the influence of poor sight had on the production of gigantic handmade manuscripts with enlarged script of the Late Medieval and early Renaissance. Illuminated Bibles and service books are replete with miniatures showing clerics reading and chanting out of tomes propped up on large lecterns, particularly in scenes celebrating the Vespers of the Dead and other daily offices. In these large shared reading events, groups of monks gathered round a single giant choir book (either a Gradual or Antiphonary) written in super-sized script and musical notation so everyone could see. DeHamel (1986) suggested that for individual reading of the liturgy, Missals (rarely illuminated) were often written in larger script so that priests could read the Mass at greater distances from the altar.

Side Bar 6

(Figure 66) is a detail from an earlier painting picturing a philosopher using a single lens (Figure 30). To the right there is second scholar with rivet spectacles and head bent reading with only one eye. This 1367 fresco by Italian Andrea dei Bartoli depicts the 4th century event of 50 philosophers confronting St. Catherine of Alexandria in an attempt to

undermine her faith. Catherine is often referred to as the Patron Saint of Learning and Education. Like the Tommaso fresco images (Figures 29 and 62), the image confirms that single and double lenses were used concurrently for reading during this formative period.



Figure 66. Philosophers using single and

Figure 67. Reading with one eye at St. Martin's deathbed

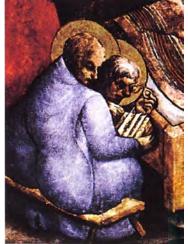


Figure 67 shows a graying man with (white bone?) rivet type 1 design in exactly the same posture as the philosopher. The scene executed around 1480, is of several men gathered at the deathbed of Saint Martin of Tours (c. 315-397), founder of the first monasteries in France. Scenes of death like this form a considerable body of religious imagery in Christian art, as the next examples illustrate.

In Figure 68, dated 1370-1372, an elderly disciple (in the lower left) is using his left eye to look through the right lens of a rivet spectacle. Here, the two apostles are reading scripture in a depiction of the death of Mary on an altarpiece at Innsbruck, Austria. Unique about this last work is that the painting is (a) the oldest surviving triptych wooden altar in the Alpine area, (b) the earliest extant representation of eyeglasses in the German speaking area (Daxecker, 1997), and (c) the first in a long line of narrative paintings of Mary's deathbed scene with one or more attending apostles using a vision aid.

Figure 68. *Death of Mary* and detail of one-eyed reading (1370-72)





Known as the *Death* or *Dormition of the Virgin*, the popular religious genre was inspired, seemingly by the story from the *Golden Legend* (see Footnote¹⁰) of 12 male apostles assembling from all over the world (and beyond the grave) to embrace and comfort the Virgin in her last hours (Thomas, 1994) (see Footnote¹¹). Usually a few disconsolate, aging disciples are shown consulting the scriptures. "The implication seems to be that even the wisest among scholars do not posses sufficient wisdom to heal the Virgin and change her destiny" (Manguel, 1996, p. 295).

The Death of the Virgin paintings are unique to the history of spectacles in that no other narrative thematic group has the distinction of so many works referencing the use of rivet spectacles. Symbolizing gravitas and intellectualism, bespectacled Apostles appear in at least 21 paintings of Mary's death from 1370-1510! A wonderful resource of rivet images, this thematic group of paintings brings to life three other unique early reading practices associated with spectacles: *magnified*,

tinted, and shared reading.

Magnifier Rivets. Several Dormition artistic works (see Footnote¹²) picture readers using spectacle lens as simple magnifiers (as opposed to dioptric corrective lenses) by laying one directly on the words like a reading stone. In *Death of Mary* (c. 1510) attributed to the Workshop of Hans and Jacob Strueb (Figure 69), young-looking Bartholomew is flanked by an older man who holds a rivet glass cases in his left hand and rivet type 1 spectacle in Figure 69. An aging apostle using glasses as magnifiers



his right, using the left lens to enlarge the letters. Conceivably, readers may have closed the rivet spectacles to form a single lens magnifier of approximately double strength (Ilardi, 2007), but I can find no image of that practice.

Tinted Reading Rivets. Another early German painting of the *Death of Mary* (1418) is noteworthy for documenting what may be the earliest representation of tinted spectacle glass (see *Side Bar 7*). To the right of the outstretched Mary in Figure 70, a bearded disciple anchors his spectacles to his nose with his right thumb and forefinger. Wearing very dark lense in ivory rivet type 1 frames, he looks down with two other apostles to consult the scroll (see Figure 70 detail).

Shared Reading. The last three examples of the *Death of Mary* (Figures 68-70) together with the *Dormition of the Virgin* (Figure 71), nicely illustrate a common reading practice with handmade books prevalent throughout the Middle Ages and early Renaissance called *small group shared reading*. In Figure 71, Mary is attended by a bespeckled, aging erudite who shares a codex with two younger apostles. Figure 70. *Death of Mary* with detail of tinted glasses





Noteworthy is the type 2 rivet frame he holds that has threads that secure the tabs together to hold the lenses. The scene is full of angst with many furrowed brows and even an apostle pinching his nose in worry. According to Mangel (1996, p. 295), the glasses were not in the original anonymous Viennese painting executed in the 11th century. The spectacles were *added more than three centuries* later in 1437-1439 (see Footnote¹³).



Figure 71. Small group shared reading with detail of an apostle wearing type 2 rivet glasses



Whereas Figures 64 and 65 are illustrative of large group choral reading behavior typically performed orally with extremely rare and valuable extra large choral manuscripts such as *Graduals* or *Antiphonaries*, small group shared reading was generally executed with a more normal sized codices (probably also costly and precious) and usually entailed either oral or silent reading of two or three people. Clearly a defining literacy practice of the Middle Ages (before the printing press and wider access to books), small group shared reading is depicted in scores of manuscript illuminations starting late 12th century. Generally, groups of three (mostly males) were shown huddled around one text, either during church services or in educational related settings at monasteries and universities.

Handmade manuscripts were costly and time consuming to produce, consequently few in number. Universities under church leadership in the 14th century having limited original texts supplied one for every *three* students (Fischer, 2003). In addition to the restricted number of books, another reason for collective reading as in scenes like the *Death of Mary* may have been a pragmatic one. Clutching spectacles to one's face, holding the open book, turning the pages and deciphering the text all at the same time had to be a challenge—gratefully shared with others.

Tinted Tidbits

The first written reference of someone actually peering through a colored lens to aid vision was made by Pliny the Elder (23-79 CE) the famous Roman scholar in 77 CE. He described Nero using an emerald to better view a contest of gladiators. The oldest surviving reference to colored glass used in spectacles was in a 1459 Portuguese document (Ilardi, 2007, p. 127).

Significantly, however, early religious paintings and manuscript illuminations started picturing eyeglasses with varying degrees of color around 1380. Lenses ranged from a slight grayish color to almost black; light green to a heavier greenish tint; or various hues of blue or brown.

Why tinted glasses? The explanation has several facets:

- 1. The first lens materials were naturally colored. Pebble quartz or beryl was a sea green stone or aquamarine as well as a smoky gray color (Rosenthal, 1996, p. 38).
- 2. Various substances to tint glass would have been easy to add in the early manufacturing of spectacles (Ilardi, 2007, p. 127).
- 3. From the beginning, the tint was believed to have beneficial effects for weak and watery eyes. Green, in particular, was thought to be therapeutic and relaxing to the eyes.
- 4. The color offered protection from glare, "white paper reading, " dust, and smoke.
- 5. Today tinted eyeglasses and therapeutic specialty-tinted contact lenses are used for children who have reading problems and for prevention of headache in migraine sufferers.

The following are several interesting tidbits about colored glasses: In the 17th century tinted glasses were especially popular for helping poor vision. Samuel Pepys who had much trouble with his eyes, wrote in his diary in 1661 that he bought a pair of green spectacles that he found most efficacious and "managed to pore over handwritten official papers by candlelight the rough long winter evenings" (Davidson & MacGregor 2002, pp. 7-8).

In the 18th century, James Ayscough first started using tinted glasses of blue and green hue to help correct certain vision problems but it was not until Sam Grant introduced sunglasses in 1929 to protect eyes from the sun that our modern shades were born (Lipson, 2008).

Today the painting of John Lennon wearing his iconic retro-Windsor "English working" prescriptions glasses with trademark yellowish-orange tint by Andy Warhol (1995) is worth an estimated 2.5 million dollars!

Side Bar 7

Bow Spectacles

Art works featuring spectacles tell a story of ^{sp} significant advances in frame design and materials occurring from 1450-1500s when lenses were connected by an arched nosepiece that formed a single unit instead of two riveted pieces. Referred to as *bow, arch, rigid bridge or round bridge spectacles*, the glasses were commonly made of leather although other materials such as iron, wood or bone were sometimes used. With a "continuous solid curved single nose bridge," bows coexisted with rivet types, gradually superseding them by the mid-1500s (Fleishman, 2011b).



Figure 72 and detail. Oldest surviving leather bow spectacles (c. 1520) and detail of slit bridge



Although they did tend to pinch the nose, leather (and later wire) round bridges were somewhat more flexible, lighter than wood or bone, and did not slide as easily off the nose. Some had ridges or 3-4 strips across the nosepiece (called *slit bridges*) that allowed for some spring to clasp the nose better—but these were rare.

Leather Framed. According to Dr. Fleishman, "leather frames had a relatively short life span from the 16th to the middle of the 18th century. Few have survived to the present day time and those are highly sought after" (2011a). The earliest extant (c. 1520) leather bow spectacles (six in total) were found in 1867 at Wartburg Castle (Figure 72 and detail), Nuremberg in the library of Willibald Pirckheimer (1460-1530). He was a close friend of both humanist Erasmus and painter Albrecht Durer who actually did several portraits of Pirckheimer.

A famous painting of Jan Van Eyck's (c. 1390-1441)) pictures one of the earliest representations of leather rigid bridge glasses (Figure 73 and detail) (see Footnote ¹⁴). Indeed, *The Virgin and Child with Canon van der Paele* (1436) is remarkable for a number of reasons. The real-life donor Peale (the person who paid for the painting) kneels on the left, holding a service book wrapped in a book cloth protector as his hand is clutching the bridge of a pair of beautiful leather convex bow spectacles he has just removed. Thinking about what he has read, the Canon's features are grave and meditative, his aging form shown in striking realism with facial folds and balding scalp as he prays for entrance into heaven through Mary's intercession. "The inscription on the frame tells us that Van Eyck painted the panel at the behest of George van der Paele (1370-1443), a canon at the Church of St. Donatian in Bruges, to which the work was presented as the clergyman neared the end of his life" (De Rynck, 2004, p. 30).



Figure 73. *The Virgin with Canon van der Paele* and detail of leather fixed bridge



Based on the paintings of leather fixed bridge spectacles, the conventions for wearing them seem similar to rivet glasses: i.e., holding them on the side of the frame in front of the eyes, pressing them to the nose, employing them as a single lens, or hanging them independently from the nose.

For instance, the bespeckled man with head tilted slightly in Figure 74 has his leather bows with dark tinted glass tucked securely on the bridge of his nose with both hands free for holding the quill and his codex. This unusual literacy scene is from the elaborately illustrated *Pembroke Hours*. In a room full of books and scrolls, the scribe, Ezra (Esdras), is shown rewriting the law apparently from memory after the Hebrew Scriptures were burned—as represented by the fire. The elaborate headdress identifies Ezra's status as an Old Testament priest of the Old Law (Leaves of Gold, 2011).



Figure 74. Ezra renewing the law and detail of him wearing leather-framed bow spectacles (1465)



In Figure 75, a nearsighted man, holds his leather-framed spectacles by the round bridge to his nose, tilting them forward to read the Christ's message on the ground in Mazzolino's *The Adulteress before Christ* (early 16th c). A unique example of a glass case to carry and protect the bows hangs from his belt.



Figure 75. Adulteress before Christ and detail of leather bows and glass case

Whereas the

theme of *Mary's Death* personified rivets, that of *Jerome Reading (or writing)* epitomized rigid bridge spectacles. The next four paintings are illustrative of scores of examples associating Sophronius Eusebius Hieronymus viz., Jerome (340-420) with various types of bow spectacles and literacy events.



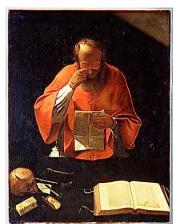
Figure 76. Example of a Van Cleve Jerome vanitas painting with detail of bow spectacles



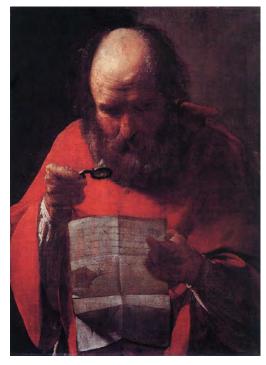
From 1510-1550, Dutch painter Van Cleve painted a series of renditions of Jerome in his study. The saint usually is pointing to a skull with bow spectacles lying close by on the

table as in Figure 76 *and detail* owned by the British Optical Museum, London. Jerome surrounded by his writing tools, is weary from composing and has momentarily laid his glasses down on the table. " The writing in the Bible is legible. The words, in Latin, appear to be those at the beginning of Psalm 51: 'Have mercy upon me, O God, according to Thy loving kindness' " (College of Optometrists, 2011a). The rest of the quote could well have read, *and you gave me glasses in my old age*!





readers must have used bow spectacles as monoculars, too. A striking 1621 painting by Georges de La Tour (1593-1652) Figure 77. St. Jerome Reading (1621)

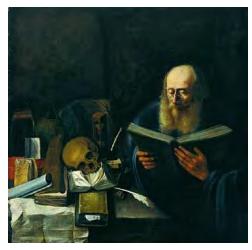


shows Jerome holding leather rounded bridge glasses by the right lens and looking through the left lens (Figure 77). The spectacles are half way between his eyes and the letter he holds. Ostensibly Jerome is using the bow spectacles as a simple magnifier to enlarge the words—much as the apostle does with the rivet type in Death of Mary (Figure 68) some 250 years earlier.

In a later painting (1652) of the same name, La Tour pictures the Church Father holding his specs on the fleshy part of his nose (Figure 78) like the Mazzolino's myopic reader in Figure 75. At the bottom left, the artist includes a wooden case among the instruments and vanitas elements. This painting and the next are the last in a long line of Jerome portraits with spectacles that are in the vanitas-study genre. Prototypes began with the Tommaso image of Jerome surrounded by writing artifacts including the horned mirror (1352) and Colantonio's *St. Jerome in his Study* (1445) with its profusion of literary tools and the earliest representation of Jerome with spectacles (Figures 18 and 19) (see *Side Bar 8*).

Nuremberg Wires. A new form of rigid bridge spectacle frame appeared in early

Figure 79. Jerome Reading and detail of Jerome reading with Nuremberg wire spectacles



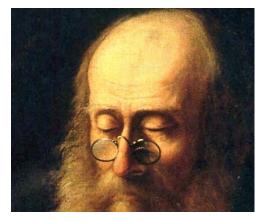
17th century Germany and is a prized item for antique spectacle collectors today. *Nuremberg wires* were comprised of a "single length of stiff wire usually copper which formed both the rim and the bridge" (Davidson & MacGregor, 2002, p. 6). Marketed to the masses all over Europe by the Germans, these spectacles may well have been the "Western world's first true industry" (Fleishman, 2011). Because Nurembergs were cheap and light, they could be worn with more ease further down on the nose as shown in this Jerome 1677 vanitas painting (Figure 79) by William van Drielenburg (1635-1687). With incredible detail and a touch of humor, the artist painted a crack in the left reading lens.

Incredibly, it was not until the 1620s that the first

paintings of bespeckled females actually reading began to appear—and Nurembergs were hanging on their noses. With the groundbreaking work of two contemporaries, Jan

Lievens (1607-1674) and Rembrandt Harmenszoon van Rijn (1606-1669) (see Footnote¹⁵), what a beginning it was!

As a child protégé, Jan Lievens painted an image of (possibly) his grandmother reading (Figure 80) when he was between 12-14 years of age (Gurewitsch, 2009). Richly dressed in an ermine fur wrap, she is intent in her book with wire glasses resting securely up on the bridge of her nose.



On the other hand, Rembrandt at age 25 painted his mother (1629) Cornelia (d. 1640) supposedly dressed as Hannah with the wire glasses almost to the tip her nose (Figure 81) (see Footnote¹⁶). The exquisite lighting effects with the luminous tome and the aging, yet glowing face full of passionate reading of the word of God make this the obvious masterpiece of the two for any bibliophile.





Head and Cap Spectacles. In rare depictions, painters have given us a sense of another unique way to keep glasses on the nose, viz., attached to hats. First representations (Figure 82) were rivet frames held by headgear (1417); later (1768), wire bows dangled by chords from caps (Figure 83). Almost 500 years after the invention of spectacles, literates were still trying to stabilize lens in front of their eyes—seemingly never having considered the use of ears as an anchor!

Figure 82. Earliest representation of a cap spectacle (1st half of 15th century)



Figure 83. 18th century cap spectacles



Jerome, the Anachronism Icon!

The most painted of all Western Church Fathers is Sophronius Eusebius Hieronymus (340-420), known to us as Jerome. First appearing around the 10th century, early manuscript miniatures began venerating Jerome in typical author portraits that harks back to antiquity—writers composing at a slanted desk in an architectural setting using only pen, knife and book or scroll.

A book on Jerome by a Bologna University professor in the 1300s was largely the impetus for the popularity of a different image of Jerome as a scholar in a profusion of literacy paraphernalia (Meiss, 1970, p. 169). This superabundance of artifacts in a limited space was a persistent icon, repeated scores of times from the early Tommaso fresco in 1352 (Figure 18) through the late 17th century. Objects included (a) *literary artifacts* (rule, pen, red/black ink, inkhorn or portable pots, scissors, manuscripts, scrolls, writing desk or lecterns, and sometimes legible mottos or a Psalm quote), (b) *religious references* (rosary, beaker of red liquid, Bishop's hat, stone and lion); or (c) *vanitas elements* (hourglass with sands of time, skull, extinguished candle, and of course, *spectacles*.

There were several reasons for artists to pair spectacles with Jerome some 800 hundred years *after* he lived: glasses were symbols for (a) old age, bodily decay and inevitable death; (b) learning and wisdom; or (c) authorship demonstrating illuminated or sharpened sight, i.e., Jerome's clarification of the word of God through his Bible translation. After all, Jerome was the quintessential scholar of the Catholic Church.

Because there were so many anachronistic paintings of Jerome that included spectacles (approximately 60 at my last count), their invention is frequently attributed to Jerome. Particularly in the late Middle Ages and the Renaissance, this belief coupled with the fact that Jerome complained of vision difficulty in his later years, lead many to regard Jerome as the Patron Saint of Glassmakers and Spectacle Makers. He correctly was the Patron Saint of Librarians, Scholars and Translators and Writings because of his masterpiece, the *Latin Vulgate*.

Thus, while artists have aided our modern day historians in documenting the use and development of spectacles, they also contributed greatly to the historical confusion of their origins. Fashioned by artists' works, *Jerome became the anachronistic icon of spectacles!*

Side Bar 8

Thread Loop Spectacles. One exception was the Spanish who were way ahead of the curve and did use the ears to anchor *thread loop spectacles*. Documented around 1500, the Spanish put weights at the end of the cords that hung over the back of the ears (Fleishman, 2011a) to further secure the glasses. By 1600, thread loops were common with the elite and large prominent spectacles were status symbols as represented in one of El Greco's finest paintings (Figure 84).

Identified as Cardinal Don Fernando Niño de Guevera (1541-1609), the Grand Inquisitor and Archbishop of Seville is wearing bow spectacles with strings looped around the ears.

His finely wrought features framed by a manicured, graying beard and crimson biretta, the sitter is perched like some magnificent bird of prey in a gold-fringed chair, his dazzling watered-silk robes, *mozzetta* [elbow-length cap] and lace-

Figure 84. *The Portrait of a Cardinal* (c. 1600)



trimmed *rochet* [vestment] flaring out like exotic plumage. The round-rimmed glasses confer on his gaze a frightening, hawkish intensity as he examines the

viewer with an air of implacable, even cruel detachment, his right hand impatiently almost convulsively grasping the armrest. (Davies, 2003, p. 282)

Pince-nez (French for "pinching the nose")

Pince-nez glasses were the last iteration of nose spectacle design to evolve. Often called *nip nose* spectacles, they were much smaller and lighter than earlier bow glasses and clipped to the bridge of the nose with a spring, giving an old world look. They came in an array of shapes and kinds: folding, hinged, rigid bridge, C-bridge, spring bridge and rimless. With adjustments to better fit noses of all shapes and nose pads for comfort, they had a minimal feel, flattered the face and were quite practical for literacy endeavors.

First appearing in the 1840s, pince-nez were, in truth, the descendants of the bow spectacles and an archaic throwback to the nose spectacles of by-gone years. "At the peak of popularity from 1885 to 1919, pince-nez accounted for roughly sixty-seventy percent of all eyeglasses worn in the US " (Alan, 2008), worn particularly for reading until their eventual demise in 1930s (Rosenthal, 1996).

Nose squashers, as pince-nez were called, had a few failings, however. Their main problem was that they could not be worn comfortably for extended periods of time. With that in mind, they were designed for taking on and off frequently and had simple chords, ribbons or chains attached to small loops on the side of the frame. Unfortunately, the chords could drag down one side and distort the vision correction function (see Rosenthal, 1996, pp. 236-257). Furthermore, because lenses had to be quite close to the eyelids, sometimes the lashes had to be cut for comfort.

While both an upper and middle class phenomena, pince-nez spectacles were particularly embraced by the elite and professional writers, artists and politicians who could afford precise fits by opticians (Alan, 2010) as typified in the three portraits of Zola, Degas and Roosevelt below.

Figure 85. Zola in pincenez spectacles (1902)





Figure 86. *Portrait of Émile Zola* by Manet (1868) and detail of pince-nez



Underscoring their importance in his literary life, Émile Zola (1840-1902) novelist, playwright, and journalist had numerous photos taken of him wearing pince-nez and also

one famous 1868 painting (Figures 85-86 and detail) executed by Edouard Manet (1832-1883). In the latter work, note the nip nose spectacles are attached to a chord around his neck, peeping out near the spine of the open book on the far bottom left of the detail.

Figure 87. *Edgar Degas* by Desbourtin (1875)



In an 1875 painting (Figure 87) by Marcellin Gilbert Desbourtin (1823-1902), Edgar Degas (1834-1917) reads the newspaper with adjustable and hinged nose nips—one of two pairs that he owned. Although the famous impressionist painter had only mild myopia and astigmatism and could read most print without glasses, he had chronic and progressive eye disease starting at thirtysix years of age. The neutral gray-tinted spectacles in the Desbourtin portrait were probably a form of treatment "which blocked out 85% of the incoming light" (Marmor & Ravin, 2009, p. 189). The retinal disease possibly drew Degas to create in pastels and sculpture and clearly affected the visual components of his work. As Marmor suggests, by midlife the paintings of Degas became

blurrier with "the shading lines and details

Figure 88. *Theodore Roosevelt* by Becker-Gundahl (1925)

of the face, hair and clothing... progressively less refined" (White, 2007).

The 26th US President, Theodore Roosevelt (1858-1919) was quite attached to his pince-nez glasses owning multiple pairs. He was pictured numerous times with his C-bridge type pince-nez glasses as in Figure 88. They went far in creating the popular image of Teddy as a jaunty, intellectual and energetic president. A number of other US Presidents wore pince-nez including Woodrow Wilson, Calvin Coolidge and Franklin. D. Roosevelt.



Temple-Fitting Pressure Spectacles with Rigid Sides

Obviously, nose spectacles did not solve the persistent problem of how to hold spectacles securely and comfortably on the face. FINALLY in the early 18th century after almost 450 years, an Englishman did find a solution! London Optician, Edward Scarlett is credited (although not confirmed) with the invention of the first rigid sides, adding them to bow or C-bridge frames with round lens. Unlike the modern spectacle frames though, this next innovative transformation did not rest on the ears, but instead was kept on by pressure above the ears on the temples.

Early Straight-Armed Temples

Figure 89 shows an example of the world's oldest form of glasses with sides, the *Scarlett temples*, first advertised between 1714 and 1727 (see Footnote¹⁷). Initially swirls (as in Figure 89) were added—then rings (Figure 90) to the ends of short stems (finials) to put the stress on the side of the head and help take it off the nose. Early models were made of iron or steel (Corson, 1967; Rosenthal, 1996) and Europeans called them *ringside spectacles* (Spectacles and Sunglasses, 2005).



"One facet of the use of temples quickly became evident, their concurrent use with the wearing of wigs" during the Rococo period, when they were popular in Europe and America (Rosenthal, 1996, p. 111). Consequently, early temples became known as *wig spectacles* with sides stopping on the temple before the wig. Later straight arms were lengthened with round and teardrop finials to more deeply penetrate wigs or hats (Figure 91) for a more comfortable fit. Paintings with representations of both the rigid Scarlett swirls and longer straight arms follow.

Figure 92. Portrait of Daniel Nikolaus Chodowiecki, German painter and printmaker



Sporting a pair of Scarlett-type spectacles, Daniel Chodowiecki (1726-1801) famous painter and one of the most popular German engravers and graphic artists of the 18th century, is taking a minute to rest his eyes from reading (Figure 92). One of only a few artists of his time who painted himself with spectacles, Anton Graff (1736-1813) the creator of Chodwiecki's portrait also portrayed himself wearing short-armed Scarlett Temples with the addition of a visor to stop the glare and bring out the colors.

An even more famous artist of the 18th century, Jean-Baptiste-Simeon Chardin (1699-1778) also painted himself in his old age (1771, 1775, 1779) with early temple glasses and an eye shade similar Graff's. In his first self-portrait (1771), Chardin wore Nuremburg-style wire round bows hanging at the end of his nose.

Several years later, he dawned longer rigid straight-armed temples probably with large round finials—proudly, almost arrogantly declaring his seventy-year-old self in need of spectacles for close work (Figure 94). Note the two different areas of the nose on which the glasses rest and how Chardin would have read and painted differently—looking down through the glasses clamped low on his nose or directly through the lenses.

Figure 93. Chardin in bow spectacles (1771)







Chardin's failing sight was, of course age-related, but also according to Boyer (2005) a result of a life-time of grinding pigments with lead base that mixed with oil burned his eyes. In the desire to keep painting through his later years, Chardin adjusted by taking up pastels that allowed for a more fuzzy medium, experimented with different types of glasses for better vision; and as in Figure 94 used an eyeshade to block out light and brighten the colors as he painted (see *Side Bar 9*). His headwear, relaxed costume of an artist at home, and large temple frames with stems are almost laughable yet at the same time "belied by the man's shrewd, concentrated gaze, and the firm set of his jaw and mouth" (Hustvedt, 2005, p. 41).

Following the early rigid temples (as worn by Chardin and Chodowiecki) numerous creative innovations in sided spectacles evolved. As we will see in the final section on lighting advances, the mid-to-late 1700s and early 1800s were a hotbed of technological advances— in this case of spectacle frames and lens design, notably three alternate types of extension-type rigid side arms and three new optical lens forms.

Extensions: Double-Hinged, Turn-Pin and Sliding Adjustable Temples

Three wrap-around temple models flourished from the mid-1750s into the 19th century. Historically, the *double-hinged* sided spectacle, invented by James Ayschough in 1752 was the first innovation (Figure 95). The second was the *turn-pin* temples produced in the later 1700s with swivels that rotated 360 degrees to fit the owner's crown as in Figure 96. The third was the *sliding temple (sliding or adjustable)* that like the turn-pin extended to fit past the temple and around the head, as in Figure 97. However, adjustables (popular in the early 19th century) had a retractable section that lengthened each of the stems and folded inward to clasp the head (see Footnote¹⁸).

Figure 95. Double-hinged temples





Figure 96. Turn-pin

Figure 97. Sliding adjustable temples



A third famous artist of the 18th century painted himself with temple spectacles in his later years. Known for his wig spectacles with turn-pin sides (worn over his wig), Sir Joshua Reynolds (1723-1792) (Figure 98), as with Chardin, struggled to be a productive artist and scholar as he aged. In the mid-1780s, he described the sudden blindness in his left eye as "a curtain falling across his face" (College of Optometrist, 2011b). The strength of Reynolds' two pair of surviving spectacles indicated that he was very myopic (-4 to -4.75 D).

Figure 98. Self-Portrait of **Reynolds** and detail of Reynolds in wig turn-pins



Figure 99 pictures an actual pair of Reynolds' turn-pins with round lens, silver

White Wall Effect

Chardin, as well as other artists, found that an eveshade made colors more distinct, and often wore one while painting. When viewing paintings at art museums, try this technique to counteract the glare of bad lighting and the white wall effect, which makes every painting on a light wall seem relatively dark. Cup your hands like a tunnel and look through it to the painting. Like Chardin, you will find the light infiltration will be less and the colors will be brighter (see Marmor & Ravin, 2009, p. 48).

Side Bar 9

frames and medium teardrop finials. They are accompanied by a shagreen eyeglass case, typically used with finer quality spectacles of the time (see Footnote¹⁹).

Patrick Henry (1736-1799) was known for his round doublehinged temple frames (Figure 100), but not resting on his nose. At least seven different paintings show his

Figure 99. Turn-pin temple glasses and shagreen case belong to Sir Joshua Reynolds



glasses with the hinges swung open to hold the glasses perched on his head-much like we wear reading glasses today atop our heads, ready for pull-down access (Figure 101).



49

Figure 100. Surviving double-hinged temples owned by Patrick Henry



Figure 102. Steel Martin's Margins

(Visual Glasses)

Martin's Margins

A collector's item today and certainly one of the most unusual styles of temple spectacles was *Martin's Margins* worn by British society, in particular, until the early 19th century (Figure 102). From the 1750s until his death, London optician Benjamin Martin (1704-1782) marketed his Visual Glasses with their inner ring of horn inserts designed to reduce the amount of light entering the eves. His "medicine for the eyes" was bi-convex so the innovation was not available for myopic readers. For the most part ineffective, Visual Glasses were

notable in that they are one of the first adaptations in which an optical innovation actually changed the very appearance of the frames. (See College of Optometrists, 2011c; Corson, 1967; Fleishman,

2011e; Rosenthal, 1996).

Defending his invention, Martin wrote in a 1756 pamphlet (Figure 103) An Essay on Visual Glasses (Vulgarly called SPECTACLES).... that

> Action of Light upon the Eye tends gradually to weaken it, the common Size of Spectacle-Glasses pours in upon the Eye-Ball three Times as much as is necessary for this Purpose; and therefore is very prejudicial to the Eye in this Respect, as in Time it makes them weak and watery.

(as cited in College of Optometrists, 2011c)

As for an aging reader and writer, Martin described the plight of the poor-sighted who no longer had a literate life:

Figure 103. Pamphlet by Benjamin Martin

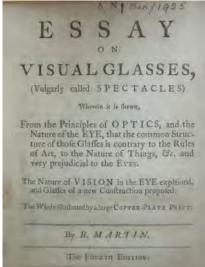




Figure 101. Patrick Henry by Thomas Sully

...How forlorn would the latter Part of most Men's lives prove, unless Spectacles were at hand to help their Eyes, and a Little Piece of Glass supplied the Decays of Nature? The curious Mechanic, engaged in any Minute Work, could no longer follow his trade than to the 50th or 60th Year of his Age. The Scholar could not longer converse with his Books, or with an absent Friend in a Letter. All after that would be melancholy Idleness, or he must content himself to use another Man's Eyes for every Line. (as cited in Corson, 1967, p. 69)

Figure 104 is a rare example of portrait of a person wearing Visual Glasses. The sitter, Admiral Peter Rainier (1741-1808) was a British naval officer in whose honor Captain George Vancouver in 1792, named the great peak in Washington State "Mount Rainier."

> Figure 104. Admiral Peter Rainier in Visual Glasses http://www.mfa.org/collections/object/admiral-peter-rainier-31255

The Admiral obviously was proud of his Martins as he posed for several portraits in them.

Four Lens Spectacles

A more important optical innovation than Visual Glasses was the *four lens spectacle*, because of their literacy versatility, viz., seeing close and distant print clearly. One set of lenses could be used alone for far-away reading or a second pair could combine with the first for better sight of print nearer at hand. As illustrated in Figures 105 and 106, two different designs were patented, the latter being more common:

In 1783, Optician Addison Smith obtained the first spectacle patent, # 1359, in London for two additional lenses hinged above the distance correction and capable of being rotated down for close work (making a total of four lenses). In 1797, English Optician John Richardson conceived the idea of different four lens spectacles where the two supplementary lenses, patent #2187, could be rotated in when doing close work. (Fleishman, 2011a)



As he looked out over the crowd at his first inauguration in 1829, Andrew Jackson (1767-1845), our 7th President, "wore two pairs of eye glasses: one currently on his eyes, and one—his reading lenses—thrown on top of his head" (Brands, 2005, p. 410). A few years later, Philip Hewins (1806-1850) painted him as solving the two-spectacle problem with four lens Richardson-type glasses. Often referred as *side cups*, Jackson's reading lenses flipped back toward the ears as seen in Figure 107 detail.

Bifocals

About the same time the English were experimenting with four lens technology for distance and close vision

correction, Ben Franklin (1706-1790) (American author, inventor, politician and founding father), was putting his own mark on optical lens development; indeed, tinkering with a similar concept called *bifocals*, also called *double glasses or split lens*. (See *Side Bar 10* for these and other examples.)



Figure 107. Detail of Jackson's

to

Awesome Slide Shows

Want to see more examples of temple eyewear? Dr. David Fleishman has put together exhaustive slide shows of Benjamin Martin Spectacles, Temple Spectacles, and Four Lens and Ben Franklin Style Bifocals—and much more—from various collections. Using the link below, pull down the menu under Collections/Virtual Museum for a real antique treat! http://www.antiquespectacles.com/

Side Bar 10

While the British Optical Association claim it is a matter of debate as to whether Ben Franklin invented the bifocal spectacle lens (College of Optometrists, 2011d), Fleishman (along with American eyeglass authority Alan McBrayer) argue persuasively that Franklin was, indeed, the Father of the Bifocals (see 2011f and Footnote²⁰).

Among the evidence that Fleishman presents are numerous letters of Franklin's including two written to his friend, George Whatley, a London merchant and pamphleteer. In August 1784, Franklin (AET. 78) complained that "he could

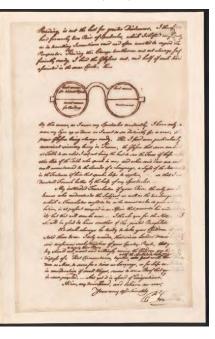
not distinguish a letter even of

Figure 108. Franklin's drawing of bifocals (1785)

large print" without them his double spectacles (Franklin Papers, August 21, 1784).

In a second letter to Whatley, Franklin said of his "split lenses" that:

> ... The same convexity of glass, through which a man sees clearest and best at the Distance proper for Reading, is not the best for greater Distances. I therefore had formerly two Pair of Spectacles, which I shifted occasionally, as in traveling I sometimes read, and often wanted to regard the Prospects. Finding this Change troublesome, and not always sufficiently ready, I had the Glasses cut and half of each kind associated in the same Circle, thus By this means, as I wear my Spectacles constantly, I have only to move my Eyes up or down, as I want to see distinctly far or near, the proper



glasses being always ready. (Franklin Papers, May 23, 1785)

The letter included a now-famous drawing in Franklin's hand identifying the stronger lens "most convex for reading" at the bottom and weaker lens "least convex for distant objects" at the top (Figure 108).

Franklin (quite the image-maker) commissioned at least 11 paintings from 1766-1785 wearing his signature Cbridge temple rings (Figure 109)—in contrasting personas of politician, scholar and philosopher (see Footnote²¹). Although probably wearing convex glasses by his 30s-40s for mild hyperopia (Fleishman, 2011f), Ben was not painted with glasses until 1766 (AET. 60) (Figure 110). In the French manner, he wore "the short





wig...favored by physicians and men of science," and sat in a classical contemplative reading pose (Chaplin, 2006. p. 193).

A decade later Ben Franklin posed for several French portraits with his iconic Canadian Martin fur cap—presenting a stark contrast to the classical look and to the powdered wigs of Paris where he lived at the time (Figure 111). Chaplin (2006) suggests that Franklin's intent was to present himself as a fur-capped French philosopher such as Jean-Jacques Rousseau or Newtonian theorist Pierre-Louis Moreau de Maupertius; while Isaacson (2003) says his taciturn expression and Quaker-like dress projected quiet simplicity with "homespun purity and New World virtue, just as his ever-present spectacles... became an emblem of wisdom" (p. 328).







Franklin probably began experimenting with bifocals in the 1760s and certainly was using them by the 1780s when Charles Willson Peale (1741-1827 portrayed him in Franklin's first portrait wearing "double glasses" (see Footnote²²). Remarkably, no earlier picture of bifocals exists (Figure 112 and detail). Following Franklin's lead, artist

Peale began using bifocals himself to paint miniatures and Thomas Jefferson, impressed with Franklin's double glasses designed his own oval bifocals in 1808 (*Side Bar 11*).

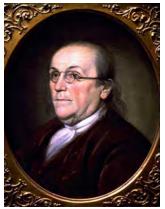


Figure 112. *Ben Franklin* with detail of the earliest image of bifocals



Jefferson's Spectacle Innovations

President Thomas Jefferson (1743-1826) wrote to John McAllister, Sr. (called America's first optician) acknowledging the convenience of the small reading glasses he had made for him, "so reduced in size as to give facility to the looking over their top without moving them" (November 12, 1806). He requested that McAllister make even smaller glasses for reading and some split lens spectacles like his friend Franklin had designed and earlier had recommended to him for reading and distance. Jefferson provided his own original sketch for the small <u>oval</u> reading frames (silver) with regular lens (as seen in Figure 113) as well as the strengths of the split lenses to be put in small <u>round</u> frames. Two weeks later, McAllister sent 6 pairs of regular glasses and 12 pairs of bifocal lenses from weak to strong—a common practice of that time so the wearer could adjust for the aging process over time with different lens choices (Thomas Jefferson Papers, 1806, December 1).

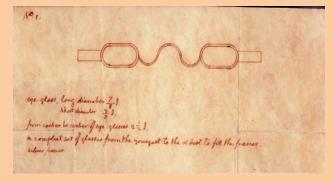


Figure 113. Detail of Jefferson letter to John McAllister (December, 1, 1806)

In a letter to McAllister two years later (1808), Jefferson stated that he was very pleased with the double glasses, but the round shaped bifocal lens turned and brought the seam in the way of the eye. Asking McAllister to solve the problem by putting the double glasses in the small oval frames of his 1806 sketch, Jefferson said that "Altho these glasses are very small and consequently the half glasses uncommonly so, I am not afraid but that they will present full space enough for reading and writing, etc...." (Thomas Jefferson Papers, 1808, November 16). Amazingly, Jefferson's idea of combining reading and intermediate vision focal lengths in so reduced frame size did not interfere with distance and essentially gave him the advantages of trifocals (Eyeglasses, 2011).

Side Bar 11

19th Century Glasses

Except for the invention of rimless glasses (1824) and the correction of astigmatism (1827)), the bulk of the 19th century brought few major technological advances in spectacle optics or frame construction (Corson, 1967). One example will suffice to give you a flavor of reading glass habits of that time.

Figure 114. Lincoln's spectacles



Figure 115. Lincoln with short temples reading with Tad



Historical records, paintings and artifacts of Abraham Lincoln (1809-1865) document some common literacy/spectacle practices of the later 19th century. Mildly farsighted, Lincoln needed eyeglasses to read in his forties. "His first spectacles, which he bought in 1856, in a tiny jewelry shop in Bloomington with the remark that he 'had got to be forty-seven years old and ... needed them' cost him 37 ½ cents" (Hapgood, 1900, p. 417). Historical accounts suggest that he used glasses to read major speeches, including his first inauguration and the Gettysburg address and that he seemed to take them on and off slowly and deliberately for stage effect as well as to actually see the text better.

Experts also think that Abe had multiple pairs of eyeglasses for different purposes: to read books, newspapers and letters depending on the size of print, light available, the aging process, etc. Indeed, Lincoln had two pairs of glasses (+2.00 and +1.75 D) on his person when he was assassinated in April 14, 1865 as shown in Figure 114 (see Footnote 23).

Most assuredly fit to Lincoln's specific needs, the spectacles at the top of the photo have oval lens, small teardrop finials and adjustable sides. The pair must have been repaired by the President himself —note the string in the upper right hand corner. The oval-shaped folding glasses at the bottom have delicate short temples with small circular ends and are represented in a touching painting by Franklin C. Courtner (1854-1947) after his death. The 16th President of the United States sits reading with his son, Tad (Figure 115) with the thin wire sides resting on his temples.

Ear-Fitting Spectacles—and Much More

Rich or poor, everyone had difficulty keeping spectacles in place... until 1880, when the first ones appeared with curved steel temples that fit snugly over the ears to hold them in place. (Kelley, 1978, pp. 60, 69)

Finally by the late 19th century, firms began making spectacles in a form we take for granted today—viz., resting on or wrapping around the ear. The application of spring

steel and fine nickel to the making of full ear pieces with lighter, flexible frames in the 1880s made it possible to bend the sides around the ears, giving a better fit, increased comfort and a more stable eye wear (Andressen, 1998; Kelley, 1978) and, even better, made spectacles more affordable (Spectacles and Sunglasses, 2005). With the advent of spectacles securely anchored to the face, no other era has produced better eyewear solutions for easier reading and writing than the late 19th to 21st centuries, with innovations including single-focus reading glasses, sunglasses, advanced bifocals, trifocals, progressive lens, contact lens, and vital individual eye prescriptions (see *Side Bar 12*, Figures 122-123).

Age-Old "Do-It-Yourself" Spectacle Fitting

Choosing the best spectacle strength for glasses changed little from the inception of vision aids until the early 1900s! In fact, we still use a similar method when picking out reading glasses at the local drugstore today! In what might be called a "potluck type" reading practice, a person would decide if he/she wanted a single or dual lens and then by reading, try various trial strengths until the letters were no longer blurry or too small.

Peddlers using this type of do-it-yourself fitting were "largely responsible for the spread of single and dual eyeglasses around Europe" (Crestin-Billet, p, 2004, p. 26) beginning with the mass production of spectacles in Germany in the early 1500s. Numerous paintings and etchings show how vendors set up stalls in towns or came door to door to sell their wares. Figures 116 and 117 picture this enduring fitting practice that literally has lasted for hundreds of years.

Figure 116. *Conspicilla* (1580/1600)



Figure 117. *Try This Pair* by Hardy (1864)



In the first quarter of the 18th century, Edward Scarlett (1688-1748) advertised his newly invented "Focus Mark" to help people identify the strength of the spectacles (Orr, 1985, p. 88). In Figure 118, the "70" is etched into the glass, probably meaning the lens

In Figure 118, the "70" is etched into the glass, probably meaning the lens was suitable for a 70-year-old person (Fleishman, 2011g).

Another trial-and-error method more specific to the intelligentsia was to order numerous pairs of different strengths to try out at home as Jefferson did in 1806 (see *Side Bar 11*). In a 1777 letter describing the process to his youngest sister, Jane Franklin Mecom, Ben Franklin gives this advice:





... I send you a Pair of every Size of Glasses from 1 to 13. To suit your self, take a Pair at a time, and hold one of the Glasses first against one Eye, and then against the other, looking on some small Print. If the Pair suits neither Eye, put them up again before you open a second. Thus you will keep them from mixing. By trying and comparing at your Leisure, you may find those that are best for you, which you cannot well do in a Shop, where for want of Time and Care, People often take such a strain their Eyes and hurt them. I advise your trying each of your Eyes separately, because few Peoples Eyes are Fellows, and almost every body in reading or working uses one Eye Principally, the other being dimmer or perhaps fitter for distant Objects.... When you have suited yourself keep the high Numbers for future Use as your Eyes may grow older; and oblige your Friends with the others. (Franklin Papers, July 17, 1771)

By the late 19th century, shopkeepers sold eyeglasses. (As noted earlier, Lincoln bought his first pair in a jewelry store in Illinois.) By 1901, Minnesota had the world's first optometry law to protect the public against "exploitation of traveling spectacle peddlers" (Kelley, 1978, pp. 77-78).

Side Bar 12

Modern spectacle history falls into two distinct time periods: (a) the advent and development of ear spectacles from 1880-1950, and (b) the era of fad and fashion from 1950-the 21st century.

The Advent of Modern Spectacles: 1880s-1950s

The predecessors of today's hooked-shaped side arms were called *curls*, *curl temples* or *riding bows*, the latter stemming from its association with horseback riding. Popular around 1880-1920s, these spectacles along with a similar model called *Windsor Eyeglasses* had round lenses, a nose saddle that rested right on the nose (but no nose pads) and stems that looped somewhat tighter behind the ear than riding bows. John Lennon, Groucho Marx, Gandhi, and Stalin wore this type of spectacle, as have David Letterman, Whoppie Goldberg and the fictional Harry Potter (Windsor Eyeglasses, 2011).

Gauguin and Monet. French artists Monet and Gauguin also donned an early form of ear spectacles. While Monet never painted himself with glasses, Paul Gauguin (1848-1903) did (AET. 54), eight months before he died of syphilis. In his later years Gauguin could not Figure 119. Gauguin's selfportrait with spectacles



distinguish faces, paint or read (or write) without his glasses. According to Danielsson (1966) when the experienced editor and journalist could no longer paint, he wrote prolifically. However, in September 1902, his close friend and poet-prince, Ky Dong picked up a brush and started a painting of Gauguin; though ill, the artist finished his last self-portrait with a mirror—a grey-haired, sick man with oval fine wire-framed curl spectacles popular at the turn of the century (Figure 119).

Claude Monet (1840-1926) wore round Windsor-like tinted "cataract glasses," the thick right lens adjusted for high astigmatism after his 1923 surgery (Figure 120) on his right eye. Because he refused to have the left eye cataract removed, the thinner left spectacle lens was made cloudy to block the images so as not to interfere with the right eye's improved vision (Marmor & Ravin, 2009).

Figure 120. Monet's earfitting glasses From 1910-1923 Monet's vision progressively worsened, as did his mental health. The artist's handwriting visibly changed; he had difficulty reading, painted by compensating for color distortion, and used "a style that did not require precise eyesight" (Marmor & Ravin, 2009, p. 141). Even with the special glasses he struggled the rest of his life with colors, and while he wrote the doctor in 1924 that he had given him back, "the sight of

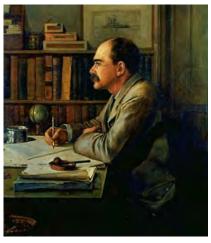
black and white to read and write," Monet complained that..."the vision of (this) painter is lost...(and) life is torture for me" (p. 169) (see Footnote²⁴).

As with painters, vision aids played major roles in the professional work and mental health of 20th century authors. Three famous 20th century writers, Rudyard Kipling, James Joyce, and Ernest Hemingway struggled with poor eyesight that greatly influenced their production, complicated their literary lives, and affected their psychological well being.

Rudyard Kipling. Kipling (1865-1936), as pictured by his uncle Sir Philip Brune-Jones (1861-1926), was a slight middle-aged Englishman with a distinctively large mustache. In Figure 121, he wears thick glasses in his study just a few years before he received the Nobel Prize for Literature. The small fine-wire spectacles curve round his ears as he pauses in his writing.

As a precocious schoolboy with myopia, scholars think Kipling suffered migraines and eyestrain from reading too much in poor light. He had to wear thick concave glasses, earning him the nickname "gig lamps or gigger," (see Footnote²⁵) slang for

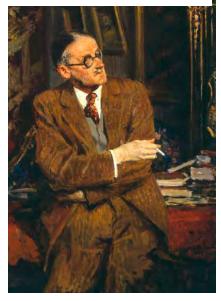




spectacles (Page, 2010). One of the great Victorian/Edwardian writers, his personal letters suggest that his eye problems were exacerbated by overwork and eye fatigue, i.e. writing too long at a time. Kipling said that his headaches made "letters hop in front of his eyes" and reported that he "could only avoid the shadows (of depression) by writing until he could no longer see." (Sheehan, 2004).

James Joyce.

Figure 122. James Joyce (1935)



Fate with cruel precision, struck Joyce, like Beethoven, in the very organ necessary for the practice of his art. (Maddox, 1988, p. 189)

Like Kipling and Monet before him, eye problems hit at the very core of James Augustine Aloysius Joyce's (1882-1941) professional being. Unfortunately, eyesight issues were only somewhat ameliorated by vision aids. In a painting (Figure 122) by Jacques-Emile Blanche (1861-1942), the Irish novelist, poet and playwright is turned away from the viewer because he was so conscious of the thick bulging left lens (Saywell & Simon, 2004, p. 343). While his first glasses were pince-nez, he is best known for his iconic enormous Empire-style oval tortoise shell glasses that were all the rage in Europe. So popular were these,

that one writer characterized Joyce and his fellow contemporaries as the "tortoise-shell-spectacle generation" (Corson, 1967, p. 229).

Widely considered to be one of the most influential authors of the 20th century in the development of the modern novel, Joyce's writing time was constantly high-jacked by severe eye problems. "Visual deterioration plagued him for more than half of his lifetime" (Ascaso & Bosch, 2010, p. 60). Eye pain, light sensitivity, blurry vision and headaches required 13 different surgeries for secondary glaucoma, cataracts, and constant treatment of severe infections of the iris (*iritis*). He would have to stay in dark rooms for weeks at a time recovering. After one such iritis attack in August, 1921, that lasted five weeks Joyce wrote, "I write and revise and correct with one or two eyes about twelve hours a day I should say, stopping for intervals of five minutes or so when I can't see anymore" (as cited in Ellmann, 1982, p. 517).

Almost blind at his death, Joyce used various vision-enhancing strategies as his eyesight worsened in order to continue writing. In addition to taking five-minute breaks to rest his eyes and writing with one eye covered or shut, he (a) used multiple magnifying glasses to enlarge the letters; (b) orally dictated to various *amanuenses* including hired literary assistants, along with his wife and son; (c) enlisted them to read back what he had dictated or wrote; (d) used charcoal and crayons to write in large child-like print large enough for him to read; (e) resorted to strong window light and good reading lamps to see letters better (Ellmann, 1982; Gilbert, 1957; Maddox, 1988); and (f) at one point, even tried recording a few pages of his last book (*Finnegan's Wake*) which were written in letters half-inch high. Poor lightening, however, made it difficult for him to read the print (Ascaso & Bosch, 2010).

Joyce's best-known strategy was his famous notebooks in which he collected and jotted down ideas, phrases and words that he liked in pocket tablets (see Figure 123), crossing out entries in various colors as he incorporated them in his novel, often with the use of a "huge oblong magnifying glass" (Budgen, 1932, p. 172).

Figure 123. Example of 2 pages from Joyce's *Finnegan's Wake* notebook http://www.brepols.net/publishers/pdf/Joyce.pdf

Joyce's constant battle to write and read his own writing was critical to the content of his stories as well as his dayto-day writing process. Kaplan (2008) suggests that Joyce's eye afflictions and poor vision were both a curse and a blessing for Joyce's rich narratives illustrating the human condition and illness, in part were due to his struggle with severe vision problems.

Ernest Hemingway. Joyce, Kipling, and Monet

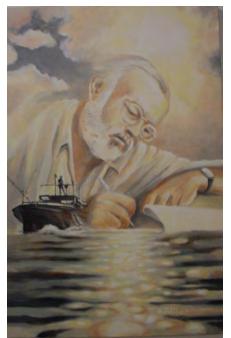
Figure 124. Hemingway in Kenya (1953-54)



all suffered from depression associated with deteriorating eyesight—so too, did Ernest Hemingway (1899-1961). In fact, Valarie Hemingway's biography (2004) tells of Ernest's failing eyesight and how it irrevocably struck at the heart of what he could always rely upon—his writing. In an interview, she said that

Hemingway read approximately three books a week, as well as many magazines and newspapers. He fished and hunted, both of which required keen eyesight. The fear of losing that capacity was devastating to him. Concern about his condition interfered with his ability to write and contributed to the deep depression that led to his decline and suicide. (Hemingway, 2004, p. 321)

Figure 125. *Hemingway* by Randy Hofman (c. 1996)



The Era of Fad and Fashion: 1950s-Present Day

Spectacles are such unequivocal evidence of old age and infirmity that (people) desire to dispense with exhibiting them as long as possible. (Dr. Kitchiner, Economy of the Eyes, published in 1824 as cited in Corson, 1967, p. 125)

For the most part, up until the mid-20th century, glasses were all about the struggle to read and write well— weapons against infirmities of visual impairment, eye disease or old age. As we have seen, while an esteemed insignia of wisdom, scholarship and intellectualism, spectacles also

Papa Hemingway (AET. 32) began wearing glasses in the summer of 1931 (Meyers, 1985). Early photos show him with round lens Marshfield-style models with a nose pad and thin wire-bound frames. Later in the 1950s, Hemingway was known for his masculine-looking Rodenstock Aviator-style glasses as seen in this photo taken on his second Kenya safari in 1953-1954 (Figure 124). Contemporary artist Randy Hofman painted Hemingway (1996) with his aviators in a similar writing pose but with his working literary life juxtaposed with his vigorous sports persona (Figure 125).

As an aside, P. G. Wodehouse gave some amusing advice to writers in the 1930s (like Hemingway and Joyce) for crafting the looks of fictional characters with regard to vision aids (see *Side Bar 13*).

Fictional Characters with Glasses—Here are the Rules!

Asserting that he thought it " absurd these days to go on writing for a normal-sighted public" P. G. Wodehouse gave these rules for writers in 1930:

- Spectacles should be worn by good uncles, clergymen, good lawyers, and all elderly men who are kind to the heroine. Bad uncles, blackmailers and moneylenders should also wear spectacles.
- Pince-nez should be worn by good college professors, bank presidents and musicians. No bad men may wear pince-nez.
- Monocles may be worn by good dukes and all Englishmen. No bad man may wear a monocle.
- Beastly tortoise-shell-rimmed things should never be worn in fiction and it is time that a stop be put to this arbitrary state of affairs (as cited in Corson, 1967, pp. 221-222).

Sidebar 13

symbolized vanitas and the deterioration and eventual death of us all (e.g., Jerome).

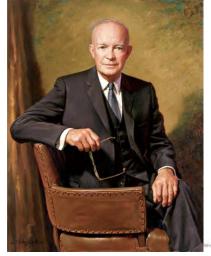
Since the invention of spectacles (some 665 years before) both men and *especially* women have been self-conscious about wearing glasses in public and often did so *only* behind closed doors until mid-20th century. No wonder the female sex rarely wore spectacles to read publicly and were seldom painted with them, when academic studies like the one in the 1920s characterized women with glasses as disagreeable and Dorothy Parker (1893-1967), the author and humorist, quipped in 1937 that "Men seldom make passes at girls who wear glasses." The French encoded "Good morning glasses, goodbye girls" (Andressen, 1998, p. 27).

Even men had a problem. Samuel Johnson (1709-1784) refused to have his picture painted with spectacles and criticized his friend, Sir Joshua Reynolds, when the artist pictured him as shortsighted—squinting at the print unnaturally close to his nose (Figure 126). "It is not friendly to hand down to posterity the imperfections of any man," said the most famous man of letters in English history (MusEYEum News 2, 2010, p. 2). The portrait is "affectionately known as 'Blinking Sam'" (Boehm, 2006).

More recently, others have had an aversion to appearing in public wearing reading glasses. For instance, at his first formal address in London at the end of WWII (1946), Dwight D. Eisenhower (1890-1969) wrote his speech Figure 126. Nearsighted Dr. Johnson



nightly for 3 weeks reading it aloud over and over to anyone that would listen. According to biographer Stephen Ambrose, (1991), Ike practiced the address innumerable times so that he could memorize it and deliver it spontaneously—*without* his



Figures 127-128.

Presidential Portrait of Dwight D. Eisenhower with plastic and goldframed browline spectacles and example of extant pair.



glasses. In countless paintings and photos, Eisenhower rarely had glasses on his ears, but often in hand, as in his official Presidential portrait that hangs in the White House (Figure 127). The 34th President (1953-1961) is holding gold-rimmed *browline* glasses (Dean-of-Men style) as shown in Figure 128 (see Footnote ²⁶).

Due in great part to the marketing strategies and innovations of European and particularly the Americans optical communities, a fundamental change in the design of eyewear and the attitudes toward spectacles began while Ike was President (1953-1961).

Manufacturers like Amor, Vogue and others began advertising glasses as glamorous for women and seriously professional for men—as depicted in a 1957 French colored lithograph (Figure 129) entitled *AMOR Lunettes*.

Figure 129. AMOR Lunettes



By the 1960s and the heralding of synthetic materials, glasses had become a fashion accessory; demanding style, comfort, and functional design. With the invention of plastics and the combination of iron, steel and nickel with celluloid, acetate or nylon, costs came down, glasses were light on the face, creativity was sparked and colors abounded. Public prominence was no longer as much of an issue for most people and ironically frames now covered almost one-third of the face! With this fad and fashion of spectacles came one significant trend: a conspicuous lack of literacy artifacts in artwork as the following examples show.

One of the most interesting female eyewear phenomena of the 1950s and 1960s was the winged shaped glasses commonly called cateyes or bat-wings. Many were surprised when Grace Kelly was photographed wearing this frame in 1955 when she visited Monaco—taken-aback that a woman of such beauty would dare wear eyeglasses in public (Crestin-Billot, 2004).

Figure 130. Men Seldom Make Passes at Girls Who Wear Glasses.



Few women had the audacity to be painted in bat wing glasses. In one rare example, contemporary painter, Alexis Smith (1985) ridiculed Dorothy Parker's quip (above) by placing the cateyes on Marilyn Monroe in a large wall painting installed at the Museum of Modern Art in San Diego (Figure 130).

Three painters distinguished themselves among the hundreds of contemporary artists in documenting spectacles as increasingly common artifacts of late 20th century society—Andy Warhol, Alex Katz and Chuck Close. Although their representational work ran contradictory to the prevailing postmodern art of the time, it is of note that theirs and most other portraits of this era had very little to do with literacy. All three portrayed large unisex browline (plastic rimmed

or semi-rimmed) glasses similar to Eisenhower's, the prevailing style particularly in the 1960s and into the 1970s (Figures 131-133).

Figure 131. *Julia Warhola* (1974) by Andy Warhol



Figure 132. *Poet Kenneth Koch* (1970) by Alex Katz



Figure 133. *Frank* (1969) by Chuck Close



Aviator-style glasses had resurgence in the 1980s and through the 1990s (Figure 134).

Figure 134. *Lee Iacocca* (1985)

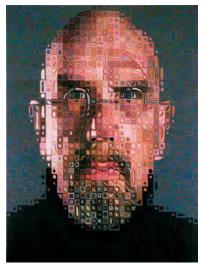
http://www.corbisimages.com/Search#p=1&q=Lee+Iacocca&ac=1

In these later decades of the 20th century, glasses grew even larger in size, particularly sunglasses which were now commonly made with individual prescriptions for reading (Figure 135).

Figure 135. Ada with Sunglasses



Figure 137. Chuck Close Self-Portrait (2004-2005)



Pop artist and filmmaker Warhol (1928-1987) wore glasses continuously, particularly oversized clear acetate Morse-style eyewear (Figure 136). Warhol tended paint celebrities like John Lennon and Lee Iacocca Figure 136. Andy Warhol with acetate spectacles (1976)



to

(Figure 134), whereas Alex Katz (b. 1929), with his colorful and bright figurative art, developed a style of portraiture that captured ordinary people peering out of large glasses that filled their faces (Figures 132 and 135).

One of the finest working artists today, Chuck Close (b. 1940) was more interested in depicting images of people he cared about including friends and fellow artists. These portraits showed eyeglasses as an important part of the personality on faces—startling in their size, sometimes 8-10 feet tall. Close, who ironically is "face blind," (Kosters, 2010) has painted a number of contemporary self-portraits suggesting that his smaller retro-oval 21st century spectacles are no small part of his identity (Figure 137).

As you might have gleaned from the last two sections on early vision aids and spectacles, *sight* and *light* are kindred concepts. Sight enhancing tools like monoculars and spectacles manipulate light for both the normal and poor-sighted—so the eye sees letters larger, clearer and brighter. Early readers and writers used mirrors for their marvelous illumination properties, i.e. their ability "to focus and concentrate light, and reflect it on to one's desk to help one in one's reading" as well as continuous writing (Thornton, 1997, pp. 167-168). It goes without saying, that good vision for reading and writing (as well as painting) requires *good light*.

With that in mind, the last section of this paper surveys the history of lighting and explores how painters portrayed natural and artificial light to illuminate scores of literacy activities and artifacts through the ages.

Illuminated Literacy

Vision aids extend one's artistic and literacy life into old age, whereas good artificial lighting extends it into the night. The 18th century biographer, John Boswell wrote of struggling to relume a candle he inadvertently snuffed out after a long stint of nocturnal writing; in the 16th century, Michelangelo grappled to see in the darkness with a candle strapped to his head while painting the *Last Judgment* in the Sistine Chapel.

Both literacy (the writer and reader) and painting (artist and viewer) are visual mediums, viz., how the eye and brain receive and interpret light. Optimal lighting, even during the day, is critical. A multitude of vision problems are especially exacerbated by low or dim light. James Joyce with severe eye disease used window light to help him better see and edit his own words. Experts believe that artists active into their later years such as Rembrandt and Franz Hals (1581-1666) were plagued by the time they reached their 50s with presbyopia and depended as they aged on quality daylight to distinguish details and colors better.

Authors such as Joyce thought "lightwriting" was a beautiful word for painted pictures (Budgen, 1934. p. 175) and other writers have eloquently described light and darkness in prose. Artists, however, have added another dimension—they "painted light." They brought light out of gloom; showed how light penetrates the blackness; and, indeed, painted "radiant darkness." Using a Baroque technique called chiaroscuro (the arrangement and bold use of strong contrasting light and dark elements effecting the whole composition), their goal was to elicit strong emotional responses from the viewer and heighten the drama in





intimate narrative scenes (Getty, 2007). Painting radiant darkness is a formidable challenge, tackled by many artists over the years, with only a few doing it *really* well (see Footnote ²⁷).

Gerard Dou (1613-1675) was one such expert painter. In *Night School* (1663-5) we see lantern and candle lit pages with barely discernible figures gathered around their glow (Figure 138). Three candles and a fourth inside a lantern illuminate this realistic nocturnal scene of adults helping children with their lessons. Considering that a standard candle gives out about 0.01876 watts, Dou gives a pretty good sense of how dark and shadowy the room was and how little illumination the candles actually gave.

On the other hand, some painters are guilty of greatly *exaggerating light with* scenes depicting more light emanating from a candle or lamp than possible. Art historians theorize that artists did not do this for artistic purposes but because they executed their works in poor/low light and expected their viewers to see the work in muted light as well.

An example of this practice of unrealistically representing actual lighting conditions can be seen in a colored engraving called the *Literary Club of 1781* by D. George Thompson



(d. 1870). Set in Sir Joshua Reynolds's dining room at night, the faces of the literary party of bewigged and some bespeckled gentlemen gathered around the table are awash with light, their features bright and clearly distinguishable. Since candles project most of their light toward the ceiling, it is highly unlikely the candelabra with only eight flames could have shed that much light on the participants (Figure 139).

The painting portrays the club's

original nine members, "wits, authors, scholars and statesmen" in Washington Irving's words (1854, p. 150). On the far left is seated the biographer James Boswell (1740–1795) with glasses. To the right, slightly in front, is author and lexicographer Samuel Johnson (1709–1784) with a large brown coat, without glasses—remember he refused to be painted with them (see Figure 126). Painter Sir Joshua Reynolds (1723–1792) with his turn-pin spectacles (pictured earlier in Figure 98) is in red by the marble bust.

Figure 139. *The Literary Club* of 1781

As a literacy practice, clubs initially were exclusive and reserved for upper class educated men who met for literary conversation and discussion. In the case of the Literary Club founded in 1764 by Johnson and Reynolds, the institution flourished through the 19th century, membership rising to forty in 1914 (with the election of Rudyard Kipling) and to fifty in the latter part of the twentieth century (Sambrook, 2009). As for men's literary clubs in the United States, groups still thrive today as a place for member readings, commentaries and literature discussion—of course, with the addition of women to the ranks (Literary Clubs, n.d.). In a modern version of literary clubs, psycholinguist Frank Smith popularized the term *literacy club* in 1988, as a metaphor for the social nature of learning to read and write. The antithesis of Johnson's Literary Club, Smith issued an all-inclusive call for *everyone*, novice and expert, to join all who use written language as their life work in and out of the classroom (Smith, 1988).

The Muse del Prado painting called *A Philosopher* illustrates two other artistic light conventions (Figure 140). Dutch painter Salomon Koninck (1609-1656) used an *oblique light* source in his compositions, showing no obvious source of illumination. In this and many other works in his oeuvre, Koninck specialized in painting scholarly old men searching for the secret of everlasting life among page-worn tomes and papers lit by a mystical light.

Moreover, note how Koninick diffused the light in such a way that the eye is immediately drawn to the luminated book and pages. Whether serendipitously or by purpose, painters have regularly treated written material in this way to make it special, using light to set off the page or paper as the centerpiece of the work with a bright Figure 140. Literacy as centerpiece in *A Philosopher* by Koninck



shimmering quality that makes the text almost seem alive. The tome that Rembrandt's mother is reading with her wire spectacles (Figure 81), seen earlier, is another exemplar of this convention that from its inception has warmed the hearts of bibliophiles and art aficionados.

Considering these artistic conventions of light and literacy, the final section explores paintings that depict different sources of light, (natural, and artificial) that allow readers and writers to see text better and illuminate literacy events reflective of broader practices.

Natural and Divine Light

Light, for humankind, has assumed many attributes over time; knowledge, truth, even enlightenment. For ages, artist have imbued the natural and supernatural (divine) light sources in their works with other symbolic associations: (a) divine light alluded to Judeo-Christian faith; (b) starlight and moonlight personified romance, poetic intensity, and other worldliness; while (c) sunlight conveyed nature and bright, fresh feelings.

Holy Light

In the Judo-Christian tradition, light is a visible sign of the divine. The Gospels refer to God as the "the Light of Men," and Christ refers to himself as "the Light of the World. (Getty, 2007)

Figure 141. *Sketch for the Annunciation* by Goya (c. 1785)



son..." (Hall, 1979, p. 19).

Starlight/Moonlight

Indeed, all three major religions (Islam, Christianity and Judaism) are religions of the Book as well as of the light. In fact, one of their most persistent and magnetic attributes of religions and cultures throughout history is the light and its importance; one of their most persistent motifs was that of darkness-light, the sun banishing the darkness of evil.

The annunciation genre is perhaps one of the best to show how artists pictured the light of God emanating from heaven. As exemplified in Figure 141 by Goya (1746-1828), the Immaculate Conception paintings executed by the Spanish artists Murillo, Greco, Zurbaran, and Melendez are especially flamboyant and dramatic with big golden swashes of luminous beams emanating from either God or the Holy Spirit symbolized by the descending dove. The focal points, Mary and her most constant attribute, the open book, are drenched in the heavenly beams of golden light. "According to St. Bernard, Mary is reading the prophecy of Isaiah (7:14), "A young woman is with child... and she will bear a

O'Dea (1958) suggests that "It is possible to read medium-sized print by moonlight, but to do so for any length of time would strain the eye" (p. 1). So as you might imagine, paintings of people reading or writing by moonlight or starlight are relatively rare; however, there are a few unconventional ones of note with literacy at the heart.

Figures 142 and 143 provide an interesting juxtaposition with contrasting titles, purposes and time periods. In an unusual nocturnal scene of the Madonna reading on the holy family's flight to Egypt (1582-87), the silvery moonlight shimmers across the landscape and together with the divine light from her nimbus, illuminates the book she holds (Figure 142). In a whimsical contemporary still life treatment of nocturnal light and literacy, *The Journey* (1987) by German painter Quint Buchholz depicts a crescent moon as a gleaming bookmark, lighting up title, illuminating knowledge in the dark of the night (Figure 143) (see Footnote²⁸).

Figure 142. Detail of St. Mary in Egypt (1582-7)

Figure 143. The Journey (1987)





Natural Light: Literacy in Daylight and Sunlight

The next section surveys examples of painters who skillfully played with the power of light and shadows, perfecting the art of direct and indirect daylight spilling on to manuscripts, books, newspapers and other reading materials, both indoors and outdoors.

Direct Sunlight. To give you a sense of the phenomenal strength of sunlight, the sun shines 168,000 times brighter than a single good candle. Impressionists loved to paint outdoor light and experiment with it. They were especially conscious of the changing colors of sunlight, and in fact, perfected special blue-ish or purple-ish tones to contrast the dazzling light with shadows.

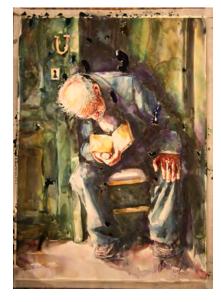
Direct sunlight is hard to read by because of the glare and requires some shade as in Figure 144. However, for those over 50 years of age and struggling with hyperopia, brighter less filtered light is a boon for "tired eyes" (Figure 145). Set in a small village in

Turkey, this learned old man is tilting the old 200+ year-old manuscript toward the light to

Figure 144. *The Reader* by Frank Benson (1910)



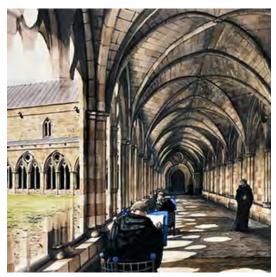
Figure 145. *Old Man Reading a Book* by Atanur Dogan (2011)



better see the handwritten old family recipes for medicinal herbs.

Indirect Natural Light. Indirect daylight is the best possible natural light by which to read and write without eyestrain. Ever conscious of light, medieval monasteries and

Figure 146. Rendering of a 13th century monastic cloister with north walk used as a scriptorium



scriptoriums were built in such a way that the monks could read and write in as much good daylight as possible and away from the sun's intense glare and the other outside elements. They often studied and meditated in cloisters (rectangular courtyard with covered walkways) to take advantage of the outside natural light. Since cloisters were usually situated south of the church, the north walkways received more indirect light and were the places to read and write. As Figure 146 illustrates, early monasteries used the shaded cloister walkways as scriptoriums where scribes composed or copied handmade manuscripts in good light (V & A, 2011).

Sometimes separate carrels (like we have in

contemporary libraries) were open to the cloister for better light (Figure 147). Scribes, as well as *illuminators* (who drew and painted the manuscript illustrations and decorations), would work there about six hours in good daylight, fulfilling other monastic duties when light was not as good. Because of the potential of danger from candles, writers would work until sunset (Avrin, 1991). In some cases scribes were very thankful for stopping then, as the following two quotes found in the margins of medieval manuscripts attests:

Thin ink, bad vellum, difficult text. (as cited in Avrin, 1991, p. 224)

Thank God, it will soon be dark. (as cited in Avrin, 1991, p. 224)

Figure 147. *St. Thomas Aquinas* writing by a cloister

Natural light streaming indoors through a window on to reading material was another light source technique used by artists in narrative art to showcase interior literate activities. Below are several exquisite examples:

Rembrandt van Ryn (1606-1669) was known as a "painter of light and shade." In fact, "the basis of his art had, from the beginning been chiaroscuro..." (Gowing, 1995, p. 716). With uncompromising realism, he powerfully crafted the whole of his compositions around the contrasts between the two elements, dramatizing and emphasizing the strong interaction of light and shadow. Some experts say his excessive realism exaggerated the

Figure 148. Scholar Reading (1631)



light and over emphasized the dark shadows (Burckhardt, 1947; O'Dea, 1958); others, he was master of them.

For the most part, Rembrandt used oblique light as in the painting of his mother (Figure 81). However, *Scholar Reading* (1631) is one of several of Rembrandt's early dramatic presentations where he did not. In a quiet vaulted chamber he plunged the reader and his books into a bath of gold sunlight from a window (Figure 148). Using a common reading gesture, the bearded philosopher tilts the open book (propped up on several others) toward the window to better gather the light to the page. Note how the shadowed recesses executed with slow gradations of yellows, browns and blacks help the viewer perceive light to dark transitions.

Perhaps the best painter of light per se was Johannes Vermeer (1632-1675) another 17th century Dutch artist. Of the 14 Vermeer paintings that picture literacy artifacts, half (7) are naturally lit genre interiors in which women are working by a window. With details crisp and shadows skillfully rendered, Lady Writing a Letter with her Maid (Figure 149) is one such example. With strong daylight accenting the writing process, the woman pens furiously; the maid waiting to deliver the letter. Red sealing wax suggests the crumpled letter on the floor was just received and thrown angrily onto the floor. Confrontation and reconciliation through the written medium seem to be the theme.

In a more placid scene (Figure 150), John

Figure 149. Lady Writing a Letter with her Maid by Vermeer (1670)



Koch, known for his light-filled realistic paintings, gives us a wonderful 20th century version of a mature woman's need for *both* natural window light and glasses to support the reading process.

Figure 150. Woman Reading a Newspaper (1975) http://www.corbisimages.com/Search#q=John+Koch&ac=John+Koch&cat=21,20,17&mt=1&cf=1

As suggested by Vermeer and Rembrandt's work, the reality of literacy was that it was pretty much dictated by the sun and the hours from sunrise to sunset for thousands of years. Man-made illumination, in the service of literacy and the nourishment of the intellect after dark was a long time coming.

Artificial Light: Extending Literacy into the Dark

Astounding as it sounds, humankind used only very primitive artificial lighting sources

up until about 200 years ago. Basically an *open flame technology*, types of illumination changed little from the birth of the Semitic Alphabet (19th century BCE) until the invention of electricity (late 19th century CE)! Battling the darkness and extending our ability to see written works into the night is the topic of the final section.

Three distinct periods of artificial lighting technology development (see Footnote²⁹) paralleled the spread of literacy and the growing need for illumination:

- 1. Early Flame Period (Ancient times-1780),
- 2. Enhanced Flame Period (1780-1880), and
- 3. Flameless Period (1880-present).

Early Flame Period (Ancient times-1780)

...With the fire lights and the burning brand in the hand of man; the conquest of light over darkness was signalized, and the night side of man's life and his progress toward culture became a theme of surpassing interest. (Hough, 1902, p. 497)

Light was Work!

The difficulty of studying or composing by open flame light at night cannot be emphasized enough. Below is a list of just some of the challenges:

- The use of fire, torches, oil lamps, and candles was stinking, smelly, smoky, greasy, messy, and dirty;
- Smoke, lampblack, grease and drippings did serious damage to plaster, painted surfaces, upholstery, as well as parchment/vellum pages of manuscripts and paper of printed books;
- Candles and lamps demanded constant attention, so that the reader/writer was interrupted every 15-20 minutes to tend the flame of candles and lamps (cleaning, gutting, and snuffing frequently);
- Seeing fine print with weak, sputtering flickering, finicky, dull and inconsistent light was difficult;
- Poor light resulted in eyestrain, deterioration and eye diseases; and of course
- There was the ever-present threat of spreading, devastating, uncontained fire from knocking over lamps/candles, explosions, flying sparks, etc.

Oh, how we take a flick of the light switch for granted!

Side Bar 14

Essentially from the dawn of writing, literates have had four choices of artificial illumination to release them from the bonds of darkness. These were universally dependent on burning material: (a) firelight, (b) torches, (c) oil lamps, and (d) candles. Colonial lamps differed little from those found in the Tombs of Ur in Mesopotamia some 5,000 years ago; candles (up until 1850s) were no different than Pliny the Younger (61-112 CE) described in 100 CE (Perry, 1969). For eons, both reading and writing by crude open flame were exceedingly cumbersome and challenging as compared to the lighting technology of today (see *Side Bar 14*).

Firelight. The advent of wood fires begins the history of artificial illumination; for they were, indeed, the first lighting technology. As Luckiesh (1920) suggests, "Fire not only banished the chill of the night but was a power over darkness.... The march of civilization had begun" (p. 4).

While painters used firelight to symbolize hell and damnation, they also portrayed the ancient practice of reading by firelight, sometimes realistically and others, not. Eastman Johnson's *Boyhood of Lincoln* is a stunning example of a faithful rendition of firelight (Figure 151). This true-to-life portrait with the firelight flickering on the open pages of the book turn toward the bright flames is one of self-education in progress.

In contrast, see how Solomon Alexander Hart portrayed the common recreational practice of reading aloud in front of a hearth in the 19th century (Figure 152). The woman's dress is appropriately bathed in firelight, but the lighting is wrong for the elderly man on the left and particularly on the surface of the book. Ostensibly entertaining the group with Shakespeare, the gentleman is holding his book the wrong way to catch the firelight in the otherwise dark room!



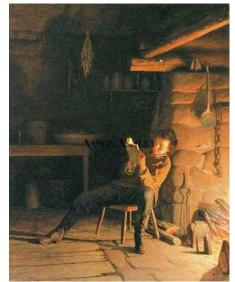


Figure 152. An Early Reading of Shakespeare: unrealistic fireside reading (1883)



Torches. With the light of the fireside came the torch (aka, burning brand), next in lighting development chronology. As the first portable independent artificial light, the torch has a different history from lamps. As an ancestor of rushlights, tapers and candles, the torch "predates the most primitive forms of lamps" (Robins, 1939, p. 6).

With little archeological evidence surviving, we do not know when early man began to use torches or how much they used them for literate activities. Written evidence suggests, the Greeks used torches exclusively up until the 6th century BCE when lamps were introduced. At first torches were bundled sticks treated with wax, resin, or pitch and later, metal or clay shafts with hollowed-out tops stuffed with oil soaked rags (Robins, 1939). Homer's poems (c. 7th century) mentioned pine torches. Those in medieval times had bundled ropes soaked with pitch (DiLaura, 2006, p. 88). More recently accounts described the poor in backwoods America using pine natural torches (called light-wood knots or candlewood) as their only domestic illumination—even as late as the Civil War era in the south (Robins, 1939; Handy, 1876).

Torches gave off a bright warm glow, but reading and close work "done by their flickering light was a terrible strain on the eyes and the heat from the blazing wood was uncomfortable in the summer. Moreover, the pitch smoke was objectionable and blackened the walls." (Handy, 1876, p. 577)

Torches were common artifacts of Jerome's time; so conceivably he would have used them to write by, as in this painting. *St. Jerome Meditating* (1525) by Jan Cornelisz Vermeyen (1500-1559) shows the great writer alit by a flaming Figure 153. St. Jerome Meditating by the light of a torch.



torch as he ponders death with iconic leather bow spectacles lying on the open book (Figure 153). For dramatic effect, the light thrown by the burning brand is greatly exaggerated in this highly unusual portrayal. Notice how unrealistically the flame illuminates the putti and even the saint himself. "The skull, symbol of earthly vanity, is literally overshadowed by Faith in the shape of the torch borne by the angels, representing the light of Christian Truth" (Louvre, 2003).

Oil Lamps. While firelight and torches heralded the beginning of night life for the Stone Age man, a different technology emerged concurrently that had a more

profound impact on literacy: the oil lamp. Cleaner and easier to tend than torches, simple oil lamps had wicks of vegetable substances. Astoundingly oil lamps were the main source of light after dark for most domestic and literacy activities throughout the western world up through the 20th century.

Stone Lamps. The first real lamps of history were *stone burners.* Initially, early man used naturally formed rock crevices; then eventually, crafted portable hallowed circular depressions from limestone or

Figure 154. Red sandstone oil lamp found at Lascaux, France (17,000 BP or 15,000 BC)



sandstone. Limestone had the advantage of not getting too hot; whereas most sandstone lamps because they were better heat conductors, had handles. One lamp put out a dim flickering light less than a standard candle's worth, but nonetheless "sufficient to guide a person through a cave or to illuminate fine work" (de Beaune & White, 1993).

Remarkably, the discovery of possibly the earliest extant lamps provides a wonderful confluence of the histories of art, literacy and man-made illumination. The first evidence of artificial light usage specifically related to literacy are found on cave walls and ceilings in prehistoric cave painting sites in Europe, some as old as 32,000 years. Evidence suggests that Upper Paleolithic man *wrote* (i.e. producing a text) with cave drawings to communicate information through pictures: the step before the more sophisticated hieroglyphics of the ancient Egyptians (Wong, 2010). Without artificial lights that

included open fat-burning lamps, as well as small fires and torches, man obviously could not have painted or, for that matter, viewed theses graphic Ice Age images hundreds of feet underground.

One of the most spectacular finds by Abbe Andre Glory at Lascaux, in southwestern France, was the spoon-shaped lamp in Figure 154. Made of red polished sandstone, the burner (8 ³/₄ inches long) with a shallow oval cup used deer fat for fuel and a wick made of a quarter-inch juniper branch. The handle was decorated with two abstract signs of chevrons (Eshleman, 2003, p. 182).

Figure 155. Artist's impression of cave painting with stone oil lamps



Figure 155 depicts an artist's rendering of how a few oil lamps may have illuminated the painting process. Jane Brox suggests in her book *Brilliant* (2010 pp. 7-9), that deep in pitch black caves of Lascaux, humans used no more than a handful of lamps to paint these murals; and if carbon dioxide built up, they would have had trouble keeping those lamps lit as they worked. While torches probably supplemented the few lamps, it was so dark that achieving the full color ranges as we see the images today would have taken 150 lamps (de Beaune & White, 1993).

Open Bowl or Saucer Lamps. The next step in lamp technology was the simple

bowl type made from clay and glass with a lip or groove to hold the wick. Often in olive or some other vegetable oil, the flame would burn with the aid of the wick made of rush or twisted strands of linen and



then put itself out when the oil was used up. Like other variations to come, the lamps were portable, put in stands of varying heights, or hung by chains as in Figure 156. Notice the putto is using

a torch to light the open bowl oil lamp to luminate the Erythrean Sibyl's tome.

Greek and Roman Lamps. From the 6th-3rd centuries BCE, the inventive Greeks introduced more sophisticated pottery with spouts (nozzles) and handles for holding the wicks and pouring in the oil.

Figure 156. *Erythrean Sibyl* and detail of a torch and saucer lamp



By the 3rd century CE, they closed in the lamps (now made on a potter's wheel) so the opening was merely a filling hole (Figure 157); by the 2nd century, manufacturing had turned to use of moldings and simple decoration was common. Romans lamps significantly differed in that they were depressed on the top around the fill-hole to a concave form, were fancier in decorative design, and generally had inscriptions of dedications or trademarks (Figure 158). Although metallic lamps go back to the 4th millennium BCE, they were most common in the Roman period beginning in the 1st

century CE (Figure 159). Frequently lamps were made with more than one burner as in Figure 160. Extant forms have been found with as many as 14 burners (Robins, 1939).



Sometimes called "wick channel " lamps, these more advanced modifications were suspended by chains hung from a spike in the wall (Figure 161), hand-carried (Figure 162), suspended from the ceiling (Figure 163), placed in a wall niche (Figure 164), or rested on a "candelabrum" or lampstand (Figure 165).

Figure 161. Catacomb spike hanging lamp http://www.artres.com/C.aspx?VP3=ViewBox&VBID=2UN365VSRUJ&VBIDL=&AT=Image

Figure 162. Hand-held metal wick channel lamp





Figure 163. Ceiling oil lamp

Classical bronze lamps were known for multiple lights and more common in Roman households than earthen ones. Put on stands or hung, these gave wider light for reading and writing (albeit rather meager as compared to today's standards) when suspended high in the middle of a large room as in Figure 166.

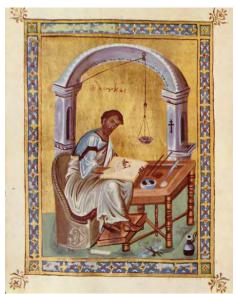


Figure 166. Scholar in his study lit by multi-burner metal oil lamp



Floating-wick lamps. Associated with the early Christian and medieval eras, floating-wick lamps are distinguished by (a) oil poured over the surface of water, (b) bowl, bell, funnel-like or cone-shaped glass form, and (c) wick suspended in the middle of the container without any spout or nozzle on the side to hold it. Originating in Egypt, these float primitive lamps spread through the

Figure 168. St. Luke illuminated by an adjustable float lamp as he writes



Byzantine culture; and migrated westward,

for the most part, perpetuated by the Jewish, Christian and Islamic ecclesiastical communities as "sanctuary" lighting (Robins, 1939).

The simplest forms of single glass vases with either pointed or flattened bases (Figure 167) are pictured in early manuscripts hanging above Biblical or medieval authors (i.e., various saints or real-life portraits of famous clerics) who are often surrounded with writing artifacts. Figure 168 is a gospel frontispiece illumination of Saint Luke (mid-10th century) in the *Constantinople New Testament* showing this type of open flame lamp in use.

Notice the ingenious pulley installed to

raise and lower the lamp for more direct light for writing.

By the early 6th century CE, float lamps were adapted into hanging chandeliers by inserting them in suspended disks in Islamic, Jewish and Christian churches, thus, providing light for religious ceremonies and the reading of "The Book," the heart of the religious services. Rows of these sanctuary vase lights suspended by chains can be seen in early Jewish miniatures such as Figure 169 from the Sister Haggadah (1350). A Hazzan is reciting orally the Haggadah from his raised pulpit (bimah). In addition to reading aloud to the illiterate congregation, the cantor also was responsible for attending the synagogue lamps.

Figure 167. Glass floating-wick oil lamp, 4th century ČE



Figure 169. A Hazzan in a Spanish Synagogue with hanging float-wick oil lamps lighting the ceremony



Figure 170. Monks chanting by the light of 3 lamps



The Windmill Psalter (1280-1300) provides a good example of Christian liturgical chanting lit by funnel-shaped float lamps hung from the ceiling (Figure 170). Four tonsured clerics share an open manuscript with musical notation on a lectern with a fish-shaped stem. The scene, like others we have seen before (Figures 70-71), shows a typical medieval small group shared reading event. The three lamps are so small, however, that they seem purely symbolic or decorative and could hardly have produced enough candlepower by which to read.

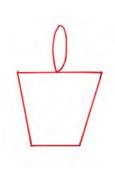
Georges de La Tour (1593-1652), another exceptional master of light and darkness, painted *Magdalene of the Smoking Flame* (1640) picturing the floating-wick lamp with excruciating and realistic detail. The brightly burning wick with water and oil in a clear glass container (Figure 171 and detail) exquisitely illuminates the books, vanitas skull, body and clothing of Mary. The glass container bears a striking resemblance to lamps pictured in an Egyptian hieroglyph found at the Rocks Tombs of El Amarna (Robins, 1939, p. 45) as drawn in Figure 172.

Figure 171 and detail. Magdalene with glass open lamp with floating wick by La Tour.





Figure 172. Egyptian hieroglyph of floatingwick oil lamp (1353 BCE)



Taken all together, the story of lighting in the dark ages and early medieval times is one of regression. For instance, in England and Normandy, torches were the mainstay supplemented with the crude earthenware open lamp types with no spouts such as the floatingwick design above—far inferior to the closed lamps of the Romans. In fact, the square cresset-stone lamp (Figure 173), an even more primitive form popular in the British Isles until the close of the Middle Ages was "little removed from the hollowed stones of prehistoric lamp-

Figure 173. Primitive cresset-stone lamp with four cups from Bindon Abbey, Dorset



makers" (Robins, 1939, p. 88) (see Footnote ³⁰).

Crusie Lamps and Variations. With the addition of a wick support, early iron *Crusie* lamps were a slight improvement over ancient open lamps such as the cresset stone—but not much. With origins in northern Europe and popular from the 16-17th centuries in the West, plebeian Crusie lamps burn most animal fats (tallow) giving a strong odor. They were distinguished by a pear-shaped or ovoid open bowl to hold the oil attached to an arm with a hook and spike, which allowed them to be hung from a ceiling or suspended from a wall (Figure 174). Found throughout Europe (except for England), most had a second bowl beneath the first to catch the unused oil. In America these *double Crusies* were known as *Phoebe* lamps (Figure 175). German speaking countries tended to favor the single "pan lamp" without a drip-catcher; and with that influence, enclosed American forms with one-pan lids evolved in Colonial times called *Betty* lamps (Figure 176). A wick holder was created in the base of the lamp and the cover meant less smoke and better light (Boyle, 2002; Old Time Lamp Shop, 2007; Robins, 1939).

Figure 174. Crusie Lamp



Figure 175. Phoebe Lamp with double pan



Figure 176. Betty Lamp with lid



Instances of early European Crusie pan lamps are represented in several realistic nocturnal 16-17th century paintings (Figures 177 with detail and 178).



Figure 177. Matthew writing by the light of an early crusie lamp (1534)



Figure 178. Girl filling a pan lamp with oil (1650)



Italian Giovanni Girolamo Savoldo's (1480-1548) specialty was night scenes and unusual effects of light and reflections. In Figure 177, the angel shrouded in almost complete shadow is offering inspiration to Matthew as the glow of the lamp shows him in the act of writing with pen in one hand and inkwell in the other. The lamp makes the paper radiate and the lines of text luminous. Flames and sparks throw up more light on the right where three men gather round a fire.

French painter Trophime Bigot (1579-1650) was known as the "Candlelight Master" with his entire oeuvre consisting of nocturnal scenes of candles, torches and lamps with strong-shadowed but subtle chiaroscuro much like La Tour (Figures 77, 78, and 171). In Figure 178, the intensity with which the

woman is attending to the oil suggests the dangers involved by pouring fuel into the Crusie lamp while the wick is aflame.

Candles.

The candle was a comparative late-comer to illumination of which the earliest positive evidence dates only to the 1st century CE. (O'Dea, 1958, p. 18)

After the lamp came the candle. Evolving historically as a child of the torch, the splinter and rushlights the candle had a very different path of development than the lamp (see

Footnote ³¹). Although, for the most part, torches are wickless, the distinction between candle and torch is often blurred. In fact, the two sometimes look so similar in early paintings that one is hard pressed to tell the difference. For instance, is the flaming taper held by Rabbi Gamaliel as he instructs his students in a miniature from the *Sarajevo Haggadah* (c. 1350) (Figure 179) a candle or a torch?

The Romans were thought to have developed the wick candle made from beeswax, although we know from Pliny the Younger's writing that they had tallow candles too (O'Dea, 1958). "Most early Western cultures relied primarily on candles rendered from animal fat (tallow)" (History of Candles, 2010). If extant paintings are any judge, candles were the dominant source of illumination for literate activities over oil lamps through the Middle Ages and Renaissance. Figure 179. Rabbi Gamaliel and students from the *Sarajevo Haggadah*



Ironically, candles were much more labor intensive to make and maintain than oil lamps. In addition to the low uneven burn and flickering light, reading and writing were interrupted regularly to attend to the candle. One had to snuff them (trimming the burned wick off) every 10 minutes and also watch for guttering (loose molten wax that accumulates around the wick). If not, the light would be diminished to about a quarter of intensity—snuffing and guttering is messy, but also tricky, because one could easily put out the candle. A draft could readily blow out a candle and if it was doused improperly, the candle would give off smoke and an acrid stench (Brox, 2010, p. 14).

The next section explores several sub-themes of candles and literacy in paintings: (a) ecclesiastical, (b) symbolic vanitas, and (c) domestic motifs and why literate people used their light.

Religious Literacy. The spirit of man is the candle of the Lord. (Proverbs 20:27)

Candles had two functions in religious communities: symbolic/ceremonial and pragmatic. The candle stood for the light of faith and was/is an integral artifact of all religious ceremonies in the three major Western religions (Moslem, Jewish and Christian). Moreover, candles were critical for light to read properly in these services and other church-related activities.

In the Christian church, beeswax candles were used in church proper for altar use and exalted ceremonies/special occasions, while tallow ones (from carefully saved kitchen fats) light scriptoriums and common areas of the monasteries and grounds. While tallow candles were smoky and pungent, beeswax was much better in giving a fragrant, clear and steady burn. However, as a luxury item, beeswax candles were "rare and costly, being the province of only churches and the wealthy" (Brox, 2010, p. 11), costing four times as much as tallow candles (Bryson, 2010, p. 116). Since the wax came from bees

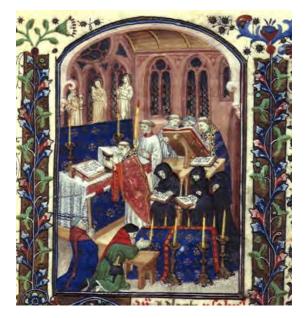
that were considered by the ancients to be divine (O'Dea, 1958), monasteries had special monks that tended bees and provided wax for Holy Day celebrations and masses (Mitchell, 1969).

An old 12th century miniature pictures a wonderful example of a long thin beeswax taper being used specifically to illuminate the reading of a manuscript. Holding the candle in one hand to light the page, the Monk Sabas reads aloud to the Emperor seated on his throne (Figure 180). The large book with bold letters rests on a lectern. This painting is particularly remarkable because it depicts the aging monk relying on over-sized script to enable him to read smoothly without stumbling or hesitation. As mentioned earlier, works to be read publically demanded a larger format, consequently accommodating for both poor eyesight and dim light (see *Side Bar 6*).

Figure 180. Sabas reading aloud with a long taper to light his manuscript



Figure 181. Candlelit Office of the Dead: Vespers



The next four paintings show both ceremonial and pragmatic uses of candles. A common Roman Catholic motif in illuminated manuscripts miniatures is the burial mass called the "Office of the Dead." The scenes were generally teeming with beeswax candles in as much as their wicks were "symbolically linked with the soul" (O'Dea, 1958, p. 142). In an evening vesper example from the 15th century Umfrav Hours (Figure 181), seven tapers in footed candlesticks surround the casket, two large candles stand on the altar and a tonsured monk holds a larger Paschal candle. Together the candles illuminate the multiple books being read at this Requiem Mass, literacy being at the heart of the funeral scene.

And thou shalt make a candlestick of pure gold: ...and though shalt make the seven lamps thereof; and thou shalt light the lamps thereof, that they may give light over against it..." (Exodus 25:31)

As an injunction in the *Old Testament*, the original Hebrew seven-branched candlestick was actually not a candlestick at all, but instead a group of floatwick lamps. Figure 182 is curious because above Joseph is a hanging Hanukkah lamp (menorah), although it is hard to tell if it contains candles or open flame lamps. Both a flaming taper and a torch on the wall light the high priest's book. In this presentation scene, Mary and Joseph are bringing the infant Jesus to the Temple in Jerusalem to "be consecrated to the Lord" (Luke 2:22-39). The caged doves in the left foreground allude to the theme of purification (Hall, 1974).

Figure 183 shows the lighting of the menorah candles that illuminate the open Talmud below on

Figure 182. *Presentation in the Temple*: Example of Jewish Menorah, torch and candle lighting in a Jewish synagogue



the table, spectacles belonging to the old cleric resting on the open seam. A portrait of Moses with the Ten Commandments hangs on the wall to the right. The Jewish Festival of Lights dates back to 165 BCE when the Jews were victorious against the Hellenist Syrians and is celebrated for eight days in November and December.

Figure 183. *Last Night of Hanukkah*: Jewish cleric celebrating the Jewish Festival of Lights



In Islam, mosque candles (and oil float lamps) indicated the presence of the divine, wisdom and truth that lightens the darkness. Figure 184 depicts Nawab of Oudh (a famous Sunni Muslim religious

Figure 184. Nawab reading loud



scholar) reading aloud at night during the Muharram Festival in Lucknow, India. Candle sconces ring the room and a large flaming chandelier lights the *maulvi* below as he

reads the scriptures to the attending worshipers.

Vanitas Still Life. As illuminated manuscripts suggest (Figures 79-81), candles in paintings were initially tied to rituals and church narratives from the early Judeo-Christian times through the 1500s. The beginning of the 16th century brought a new type of candlelight painting, the vanitas or skull motif.

Serving as a transitional genre with recurring iconographic components of candle, writing materials, inscriptions and books, these vanitas works bridged the divide between the religious and nonreligious with a complicated mixture of the church spiritual messages about one's mortality and a reaction against the wealthy by the intelligentsia and merchant classes. Two clearly different vanitas forms evolved at the end of the first quarter of the 16^{th} century: (a) Jerome in his Study portraits (seen earlier in Side Bar 8 and Figures 76-79) containing only several vanitas elements, and (b) still life vanitas depictions (divorced from figures) of solely inanimate objects (see Side Bar 15), including candles and literary artifacts.

Vanitas Candles

He who thinks of death can easily scorn all things.

(Hieronymus in *Epistolae* [53, 11, 3] as cited in Schneider, 1999, p. 77)

In the 1500s a form of still life emerged called *Vanitas* (Latin for vanity) or *memento mori* flourishing particularly in Holland in the 17th century. Generally, the genre referred to a collection of objects that stood for the brevity of life and transience of earthly pleasures.

While the lit candle in paintings meant the flame of life, the barely flickering, and of course, the extinguished candle, were metaphors for death or that time was running out. For instance, in the earlier mentioned Death of Mary motif (Figures 70-71), the dving (or dead) Virgin often holds either a waning or extinguished candle. In Jerome study themes (Figure 76), the snuffed candle and the accompanying spectacles signified old age, failing eyesight and impending demise. Books and notes/inscriptions accompanied by the candle signify transience of human knowledge and vanity of scholarship, and the ephemeral nature of thoughts on paper.

Side Bar 15

One of the earliest examples of the latter is by Bruyn the Elder (1493-1555) (Figure 185).

On the back of a portrait of Jane-Loyse Tissier, "the detached jaw suggests the dissolutions of the personality, the snuffed-out candle the extinction of life, the fly—symbolic of the devil—the maggots that will slowly destroy earthly beauty" (Ebert-Schifferer, 1999, p. 31). A note in the right hand corner says in Latin that "Everything decays with death/death is the final boundary of all things" (Schneider, 1999, p. 77).

Nonreligious/Domestic Literacy. As for secular reading and writing at night at home and work in this early period of open flame technology, the vast majority of the Western population depended on "tallow candles" as the chief source of light up until the 1860s when better paraffin candles were produced. Even the best-read people used



tallows sparingly because of cost and availability issues.

Reading and writing had to be difficult because a single "good" candle could barely penetrate the darkness, giving only $1/100^{\text{th}}$ of the illumination of a 100 watt-bulb. As noted earlier (see *Side Bar 1*), vision problems of hyperopia, myopia and presbyopia are exacerbated at night when eyes are tired and by dim or poor light; and candlelight barely sheds enough light to see small print with normal eyesight. Bryson (2010) astutely points out that opening our refrigerator door "summons forth more light than the total amount enjoyed by most households.... [from antiquity until the late 19th century]. The world at night for much of history was a very dark place indeed" (p. 12) (see Footnote 32).

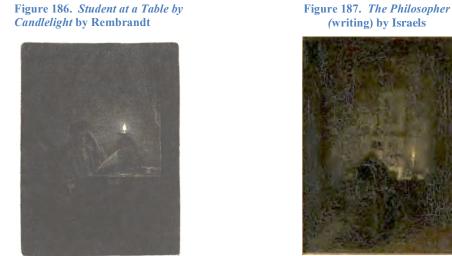
Paintings began capturing this idea of dim candlelight in a wide range of non-religious and domestic literacy settings and events— but not until the 17th century. A survey of the corpus of nocturnal candlelight portraits of the next two centuries show a broad range of purposeful secular activities (Figures 186-195). Laymen (and a few women) were pictured reading/writing for educational, scholarly, professional, communicative, informational, and recreational reasons. Earlier paintings presented here (Figures 37, *Night School and* Figure 38, *The Literary Club*) are good exemplars of early childhood education and group erudite pursuits by candlelight.

Of all of the works, the first two examples below give you the most dramatic and realistic sense of how it was to read and write, lost in a vast pit of shadow and inky black with a single burning flame (Figures 186-187)—this is the way it was for centuries before any significant advances were made in man-made lighting technology.

Why Did the Layperson Read and Write by Candlelight?

Figure 185. Early vanitas still life (1524)

1. For budding academic study and deeper, continuing scholarship of the lettered; (Figures 186-187);





2. For purposeful professional and working life or recreation and enjoyment; (Figures 188-189);

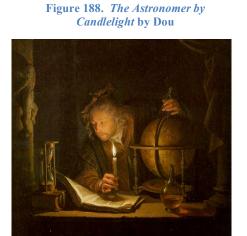


Figure 189. Singing Couple by van der Meer



3. For knowledge of what is already written or for imparting new knowledge (Figures 190-191) (note juxtaposition of young and aging vision);

Figure 190. Young Man Reading by **Candlelight** by Stomer



Figure 191. Old Man Writing by Candlelight by Terbrugghen



4. For private or group correspondence (Figures 192-193); and



Figure 192. Portrait of a (myopic) Man by

Figure 193. *Girl Reading a Letter with an Old Man Reading over her Shoulder* by Wright of Derby



5. For public or personal news and information (Figures 194-195).

Figure 194. *Reading the News* by Culvershouse





Figure 195. *The Politician* reading a newspaper

Enhanced Flame Period (1780-1880)

Evidence suggests that literacy was clearly a catalyst for rapid advances in lighting enhancement in the century from 1780-1889 (Perry, 1969; Robins, 1939). Rising literacy rates, demand for better light to read by, and wider range of availability of reading materials encouraged the first big surge of advances in lighting technology since ancient times. Three more efficient lamp fuels and central draft chimney technology lead the list.

Fuel Advances. Lamps and candles depended on vegetable or animal fat from their inception. Advances in types of fuel in the enhanced flame period (1780-1880) drove innovations in lamp technology and were critical in the transformation from ancient to modern lighting sources.

Figure 196. Harpooning a whale (c. 1814)

Whale Oil. The blubber of various whale species became a new source of illumination from the late 1700s until the 1860s when the whale population was devastated. The first oil to achieve commercial value, whale tallow was cheap and in demand in its hey-day because it burned brighter than other animal tallow (Figure 196). However, whale oil still smelled terrible, although not as bad as lard. The affluent used premium sperm oil with a better odor—with a price tag of some \$200 per gallon in today's currency.



Natural Gas. Leading innovation in the early 19th century was the first fuel without a wick, *gas.* Initially a byproduct of coal, gas's first application was in the UK at factories, shops and institutions that found candles prohibitive because of the expense and tending involved. The next major application of gas was for street lighting. Gas was especially popular in England and the United States with major American cities like Philadelphia, New York and Baltimore having gas works and streetlights by the 1830s (Brox, 2010, p. 60). Gas was not available for domestic use and did not become common in homes until the 1850s (Bryson, p. 123). Because gas took special burners, and more importantly, a distribution and installation system, the innovation took almost a century to spread.

Kerosene. Also developed in the early decades of the 19th century, *kerosene* was another important fuel of illumination and cheaper than natural gas. Whales might have become extinct if it had not been for a series of events starting in Nova Scotia in 1846 that lead to the development of one of the most contentious and sought after products in the entire world. Abraham Gesner, a physician, invented a way to distill a combustible liquid he named *kerosene* that burned as clear, clean and bright as whale oil, and did not spoil over time (Bryson, 2010). His first source was from coal, the reason why some people called kerosene "coal oil" (see Footnote³³). When Edwin Drake found petroleum in Titusville, PA in 1859, "the immediate demand for kerosene [a by-product of the refining process] ushered in the age of oil" (Brox, 2010, p. 83) and "the beginning of the 'Kerosene Era' in which the slogan 'a lamp in every room' was realized (Miller & Solverson, 1992, p. 8).

The one big advantage over gas (and later electricity) was that kerosene fuel was far less costly to distribute. As a result kerosene oil became widely used by the 1860s. Safe, cheap, and abundant, the fuel was available to the general public and rivaled gas through the turn of the next century as the most popular source of reading and domestic lumination in millions of homes, particularly in small towns and rural areas.

Candle Advances. In the first major change in thousands of years, tallow candles were improved with the introduction of wax from the cavities of sperm whales in the late 18th century. In 1751, Benjamin Franklin wrote to Susanna Wright exclaiming the virtues of the whale tallow candle:

When I had the Pleasure of seeing you, I mention'd a new [kind of Candle very] convenient] to read by, which I think you said you had not seen: I take the Freedom to send you a Specimen of them. You will find that they afford a clear white Light; may be held in the Hand, even in hot Weather, without softning (sic); that their Drops do not make Grease Spots like those from common Candles; that they last much longer, and need little or no Snuffing. (Franklin Papers, 1751)

New style table lamps were designed for multiple spermaceti wax candles such as the brass *Bouillotte* Table Lamp. Named for the French card game popular at the end of the 18th century, the lamp was fashioned to hold the game chips and prevent glare from the multiple candles as they burned down. With 2-4 candleholders and a metal shade, the top had a screw that allows one to move the shade down on a central shaft as the candles melted. As shown in Figure 197, the Bouillotte was advantageous for literary pursuits as well as recreational.

Oil Lamp Advances. Although candles were the major source of domestic lumination from 1780-1880, oil lamps were close in popularity, especially in America with the thriving whaling business. The first basic change in ancient oil lamps after literally millenniums and the "real

starting-point for rapid progress in the development of lighting appliances" (Robins, 1939, p. 109) was the invention of the Argand Oil Burner patented in 1780 in England by Aimé Argand (Figure 198). Only used by the more affluent, the lamp consumed considerably more fuel (first vegetable oil and then whale oil) and was made from bronze, silver, crystal, or other expensive materials. However, it literally increased the lighting

Figure 199. Dr. Leroy writing by a French Quinquet lamp



power higher than ever before, producing the light equivalent to

6-10 candles because of a central chimney that increased the draft (thus oxygen) and a new kind of wick, that together with the better air flow, required less frequent snuffing. Another advantage was



Figure 197. French Bouillotte lamp



Figure 198. Argand central glass chimney lamp with circular wick

the arm that allowed closer positioning of the light over the reading or writing materials as in Figure 199. To top that, the lamp was smokeless!

Figure 199 depicts Dr. Leroy (probably the obstetrician of the artist's wife) leaning on a volume of Hippocrates' Morbi mulierum (The Diseases of Women) and writing under the light of the French version of the central burner called a *Quinquet*. Although given credit for the addition of the enclosed glass chimney (Robins, 1939), supposedly AntoineArnoult Quinquet (1745-1803), a pharmacist in Paris, copied the invention from his friend Argand and wrongfully claimed it in France under his name.

Figure 200 shows the Argand Table Lamp with a green transparent shade. Ironic as it sounds, the central burner fueled with whale oil gave *too* much light and required screening, too bright for most reader's eyes. "After so many centuries of dreaming of more light, people [had to] shield the flame.... These were the first lampshades" (Brox, 2010, p, 54).

Brilliance, however, came at a high price most could not afford. The increasing cost of refined sperm oil led to the use of the common man's grease or lard oil lamp, a version of the central burner with an upright wick. Popular from 1820-1850s, especially in America, they

Figure 201. Still Life with Book, Pipe, Lard Lamp and Match



made of tin, pewter or bras and had cylinder forms

commonly

were

Figure 200. *The Elegant Reader* with an Argand lamp



cylinder forms on stems like candlesticks as seen in John Fredrick Peto's (1854-1907) still life representation in Figure 201. The match lying on the table beside it was another significant invention of the time period affecting literacy activities (see *Side Bar 16*).

On a literary note, Noah Webster (Figure 202) complied his two-volume *American Dictionary of the English Language* published in 1828, by the light of two tin lard oil lamps with a font that tilted to keep the wick in the oil and a corrugated metal reflector to increase the light (Clute, 1941). Figure 203 is a photo of one of these lamps.

Figure 202. Noah Webster



Figure 203. One of Webster's tin lard lamps with reflector



Gaslight Advances. Gaslight was the first reading light "without a wick. " How many people actually read/wrote by gaslight vs. oil lamps is difficult to tell. Gaslight's initial history and development was one of commercial and public and later personal and domestic use.

Figure 204. William Murdoch



The ""Father of Gaslight" was William Murdoch (Murdock) (1754-1839), a Scottish engineer and inventor (Figure 204), who is credited with lighting the first domestic residence. He piped in natural gas to his own home in Redruth, Cornwall in 1792. Available domestically

by the mid-1800s, illumination by gas was more of a middle-class phenomenon, as the poor could not afford gas and "the rich tended to distain it" (Bryson, 2010, pp. 123-124).

Lighting the Light

Many do not realize how recent an invention matches are in the scheme of human development. The safety match was not invented until the late 1800s.

Before that there were only a few ways to light an oil lamp or candle: sparks from (a) striking flint against iron (tinderboxes), (b) friction between hard or soft wood (firesticks); and (c) burning magnifiers. Last resort was the borrowed of an existing flame or coal.

James Boswell (1740-1795) in 1791 wrote that at 2:00 in the morning he inadvertently snuffed his candle while writing. He couldn't find a tinderbox, the firelight had gone cold and he finally had to depend on a watchman from the street to "relune" without danger about 3:00 AM.

Side Bar 16

In addition to the infrastructure needed to get gas in homes and business, there were a number of drawbacks to gaslight: headaches, nausea, blackened ceilings, greasy soot, discolored fabrics, and most of all, danger of explosion. Another disadvantage was that gas fixtures were not moveable, so readers or writers were restricted as to where they could work at night—a kerosene lamp was portable.

The wonderful thing about gas lighting, however, was that it was exceedingly brilliant, as much as 20 times brighter than any other luminate. As Bryson (2010) suggests,

...It [gas] provided wonderful overall illumination, making reading, card playing and even conversation most agreeable.... Book titles became discernible on their shelves. People read more. It is no coincidence that the mid-19th century saw a sudden and lasting boom in newspapers, magazines, books and sheet music. The number of newspapers and periodicals in Britain leaped from fewer than 150 at the start of the century to almost 5,000 at the end of it (p. 123).

Figures 205-206 depict the public and commercial nature of 19th century gas lighting and public institutional reading done by it. The first is an engraving of a nocturnal oral reading of scriptures in a poor house and the second is a painting by Richard Carlton

Figure 205. Scripture Reader in a Night Refuge (Poor House).



In the 1879 etching (Figure 207), Mary Cassatt (1844-1926) evoked the tranquility of domestic life using her mother and sister, Lydia, as models. One woman is reading, the other mending, both sharing the bright light of a table gas lamp—but, notably, not each other's space. Cassatt suffered eye disease that affected her painting, just as other famous artists mentioned

Figure 207. Under the Lamp by Cassatt



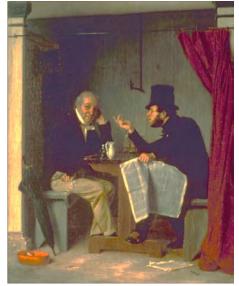
(see Tate Website, Figure 208).

earlier (see Footnote ³⁴).

Figure 208 is a good example

Woodville (1825-1855) showing gas piping snaking along the upper wall of an eating establishment. The arm going down the wall to the table connects to an unadorned flat flame burner. By the late 1800s, Murdock's invention saw its way into more affluent homes for domestic use as shown in Figures 207-208.

Figure 206. *Politics in an Oyster House* (with gas lighting fixtures)



of artistic license and exaggerated lamp output. The widower with the gas lamplight unnaturally illuminating the whole room has stopped reading his newspaper to listen to his daughter sing. She sounds so much like her mother. The work was exhibited with the lines from a Tennyson poem: "But O for the touch of a vanish'd hand/And the sound of a voice that is still"

Figure 208. *Her Mother's Voice* by Sir William Orchardson (1888)

http://www.tate.org.uk/servlet/ViewWork?cgroupid=999999961&workid=10956&searchid=13539

We dreamed of the [kerosene] lamp which gives luminous life to dark matter.... The lamp [of petroleum] makes light ascend from the depths of the earth. (Bachelard, 1988, p. 66)

Modern Lamp and Candle Advances. In the quest for better illumination, neither gas nor the Argand burner achieved the universality of the last major advance of the enhanced flame period of 1780-1880. The advent of kerosene initiated a revolution in artificial lighting during the Victorian Era with a profound social effect. For the general public (poor and rich alike), the dawn of petroleum brought a new cheap fuel for lamps and for candle making (paraffin) that superseded tallow from whales. The enduring draw and success of kerosene lamps was evident in the over 1600 patent applications for improvements filed through 1880 (O'dea, 1958).

The net result [of this lighting revolution] was a perfect oil lamp with a reservoir in the base of it, the fuel being fed to a circular or flat wick by capillary attraction and a draught-producing glass chimney to insure a clear, steady light. It was the to 19th century what indirect electric lighting is [was] to the 20th. (Clute, 1941)

Figure 209. The Smolensk Newspaper by Chagall (1914)



Kerosene (called petroleum in Europe) lamps usually burned as brightly as 5-14 candles (Brox, 2010, p. 82). They came in all shapes, sizes and forms— parlor lamps, table lamps, hanging area lamps, student desk lamps, floor lamps and sconces popular collector items today because of the beauty of their bases, oil containers, chimneys and shades.

Kerosene lamps pictured in paintings around the turn of the century suggest the lasting hold this artificial light source had

over gas lighting (and electricity) into the 20th century for both public and private venues. In an example of a common public literacy practice, Marc Chagall (1887-1985) depicted a café scene in which two men are discussing a newspaper article. A copy of the Russian *Smolensk Herald Newspaper* is the centerpiece of this celebrated scene painting (Figure 209). Lit by a circle of flickering greenish light from a kerosene lamp, the paper's headlines read *Voina* or *War*. The men sharing the news react differently; the younger on the left looks worried and disbelieving, the older on the right looks pensive and thoughtful.

Domestically, although one could read and do close work by the gas flame without eyestrain, people were hesitant to embrace the technology, many opting to keep their kerosene lamps to illuminate nightly domestic activities instead of installing gas in their homes. As pictured in this Pierre Bonnard (1867-1947) painting (Figure 210), a well of

darkness and shadow engulf the family gathering. Yet with the shade forcing the light

down, there is an intimacy and togetherness under that warm soft yellow glow.

Around the turn of the century, the somewhat romanticized kerosene lamp became a frequently painted artifact by avant-garde artists of the Pointillism, Nabis, and Cubism movements. Their works give us varied and at the same time, magnificent examples of these lamps and how they were used in literate activities as shown in the next seven examples.

The Student Lamp. One hundred years after its invention, the Argand burner

was adapted by German Adolph Kleeman to use cheap and plentiful kerosene. Sold by the thousands to the general public in the Victorian Era, it was known in America as the *Student (or Study) Lamp* or in Europe as the *Reading Lamp* (Figure 211). Generally a table model, the Student Lamps were not intended for area lighting, but instead for a

The Non-Explosive Lamp Company

One of the most popular American manufacturers of the Student Lamp was the Cleveland Company. Its well-known model was advertised as "The Best Study or Library Lamp in the World." The style could burn either gas or kerosene for as long as 9, 17 or 24 hours on one reservoir (Miller & Solverson, 1992, p. 22). With a name like "The Cleveland NON-EXPLOSIVE Lamp Company," who wouldn't want to buy a lamp from them?

Side Bar 17

or area lighting, but instead for a smaller intimate area. Indeed, crafted specifically for reading and writing activities, they were uniquely designed to minimize shadows and push the light downward onto the page for studying. "Most were adjustable in both its vertical height and its horizontal swing" (Miller & Solverson, 1992, p. 1). (See *Side Bar 17* for additional information.)

French pointillist Paul Signac (1863-1935) nicely pictured how the swing arm allowed the fuel reservoir to be

out of the way so the page could go directly under the light for brighter reading or writing (Figure 212). In an unusual scene for the time, Figure 213 depicts a little girl multi-tasking—knitting and reading at the same time by the white light of her student lamp.





Figure 212. *Woman with Lamp* by Signac (1890)

Figure 211. Cleveland study lamp (1863-1873)





Figure 213. Little Girl Reading and Knitting by llsted



The Rochester Lamp. Around 1883, American Charles Stanford Upton (1844-1897) helped light up the life of literates by inventing the Rochester Lamp, yet another improvement of the 100+ yearold central draft technology. Upton was an avid reader and spent many evenings with a good book and newspaper. According to Shilling (1993), Upton was dissatisfied

Figure 214. Rochester Lamp Advertisement



with the inadequate amount of light produced by the flat wick kerosene lamp and theorized that three or four wicks sewn together into a tube would give several times the light of the flat wick lamp. Teaming up with Leonard Henkle, a lamp maker, who patented the perforated thimble (a flame spreader), they invented the most popular and best-designed central draft lamp of the era (Figure 214). Revolutionizing the old kerosene lamp, "their amazingly successful venture brought artificial light to millions around the world for more than half a century" (Shilling, 1993). Advertised as the *Best Lamps on Earth* (see Footnote³⁵) in 1885, these lights survive today in the form of Coleman lanterns.

There are a number of paintings with the Rochester-like lamps around the turn of the century in which literacy is the focal point. Figure 215 is one particularly good example of a lone reader silently engrossed in a book, the glow from the oil table lamp illuminating the page surrounded in a shadowy night interior. The hanging kerosene lamp in Figure 216 provides wider area lighting for a family literacy scene that, among other reading practices, includes an oral reading lesson. Pablo Picasso, in one of his earliest works, portrays his friend, sculptor and author Joseph Cardona at his tiny desk in an intimate writing scene illuminated by the kerosene's yellowish glow (Figure 217).

Figure 215. *By Lamplight* by Harriet Backer (1890) Figure 216. *The Reading Lesson* by Ekvall (1912)

Figure 217. Portrait of Joseph Cardona by Picasso (1899)



In more contemporary renderings, the collages of complex configurations of Cubists Pablo Picasso (1881-1973) and Juan Gris (1887-1927) and Surrealist Joan Miro (1893-1983) speak to the universality and everyday use of the kerosene oil lamps in the early 1900s (Figures 218-220).

Figure 218. Still Life with Skull, Book, and Oil Lamp by Picasso Figure 219. *Still Life* with an Oil Lamp by Juan Gris





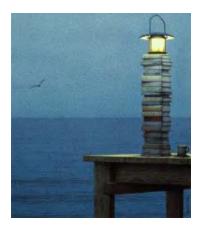
Figure 220. *The Kerosene Lamp* by Joan Miro



Significantly, Brox (2010) christened kerosene lighting as "the last self-tended flame...the last open fire in the home " (p. 88-89).

Figure 221. *Book Lighthouse* by Buchholz

We began the oil lamp's story thousands of years ago with stone artifacts and the juniper wick found deep in the caves of Lascaux and ended it in the modern age with kerosene lamps, "the last open flame" of artificial lighting. Ah, but like a beacon in the night (Figure 221), the ancient oil lamp and its ancestors, the age-old servant of literacy, finally succumbed to a higher form (see Footnote ³⁶).



Flameless Light Period (1880-present)

Fortunately, light without fire was our future. Nevertheless, in an attempt to stem the tide of the inevitable of flameless dominance, the Upton Rochester Lamp Company advertisement ran the following newspaper ad in the 1880s:

Electricity costs, one night, 60 Cents. 300 Candle [power] Rochester only costs, one night, 5 Cents (as cited in Shilling, 1993).

But never mind the cost difference, "electric lighting was ultimately irresistible. It was clean, steady, easy to maintain and available instantaneously in infinite amounts at the flick of a switch" (Bryson, 2010, p. 134).

The Early Years. Taming electric light, however, took several centuries of sporadic trial and error experiments. Albeit at a snail's pace when compared to the rate of advances today, readers/writers slowly transitioned through the early 20th century from dependence on the flicker of flames to the brilliance of the flameless incandescent light bulb. Just as with so many innovations, electric lighting started in the homes and businesses of the privileged and moneyed literates.

Benjamin Franklin (1706-1790) not only invented the bifocal, but also contributed mightily to the understanding of electricity with a corpus of written

works and experiments, one of which clarified that lightening and electrical charges were one and the same (Figure 222). His friend, artist Benjamin West (1738-1820), painted this posthumous portrait of him in 1816, portraying Franklin as a classical hero and

Figure 223. Craigside, Northumberland, UK: The first house to be wired with electricity



scientist discovering the lightening rod.

As to the actual invention, Sir Joseph Swan (1828-1914) was well ahead of Thomas Edison's (1847-1931) accomplishments. First introducing to the public his new electric incandescent light (albeit working only a few minutes) in Newcastle, England in 1879, Swan wired the world's first electrical home (as shown in Figure 223)—all before Thomas Edison (1847-1931) could accomplish anything of import in the field of electricity in America.

Figure 222. *Benjamin Franklin, Drawing Electricity from the Sky* (in an experiment of 1752)



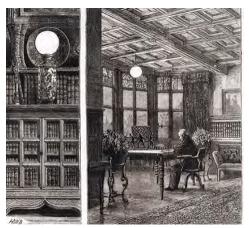
The owner of the first electrified house, Sir William Armstrong (1801-1900), a mechanical engineer and inventor, installed Swan's light bulbs at his home called

Craigside (Northumberland) in 1880. A newspaper illustration during that time (Figure the 224) showed him reading at night below one lamp of eight that he had installed in the very first study to have electricity. He used the brook on his property to make the electricity!

Figure 225. Thomas A. Edison (1890)



Figure 224. Sir William Armstrong reading by an electric lamp in his study.



Edison's "genius was organizing and producing electricity on a grand commercial scale" (O'Dea. 1958, p. 134) (Figure 225). I find it noteworthy that Edison first installed electricity in places that catered to very literate people and activities such as the New York Stock Exchange, the House of Commons in

London, and importantly, The New York Times building. In 1882, Times newspaper journalists came out unanimously in favor of electric over gas, saying that

It was a light that a man could sit down under and write for hours without the consciousness of having any artificial light about him.... The light was soft, mellow and grateful to the eye, and it seemed almost like writing by daylight to have a light without a particle of flicker and with scarcely any heat to make the

Figure 226. *The New Homestead*: Rural reading by electricity in the 1930s



headache. (as cited in Brox, 2010, pp. 122-123)

While the larger city populations had flameless lights early on, electricity only reached about 35 % of the American urban and suburban population by 1920. The last vestiges of oil lamps and candles did not disappear until the 1930s when President Franklin Roosevelt's New Deal made rural electrification a reality (Figure 226) (Brox, 2010). **Modern Times.** Today, hardly a modern literate activity (day or night) transpires in which some sort of electric power does not play a part—emailing, texting, e-book reading, word processing, publishing, even old fashioned book reading at night. The last vestiges of the old flame technology are the Coleman lanterns and candles, light sources for reading and writing for the most part relegated to outdoor camping and power outages (Figures 227-228).

Figure 227. *The Camp*: Outdoor camping and open flame lighting



Yet, like eyeglasses, electric lighting technology and associated artifacts have become so ubiquitous and accepted they are invisible to us and to painters. Electric lights are rarely pictured or featured as important artifacts in paintings since mid-century. Figures 229-230 are two early 20th century examples by Picasso and Rockwell. As modern oil lamps before them, shaded table and student lamps with flexible long arms or goosenecks seem the standard for brighter reading and writing experiences (Figures 231-232) in contemporary times.

Figure 229. *Reading at a Table* by Picasso (1934)



Figure 230. Detail from And Daniel Boone Comes to Life on the Underwood Portable by Rockwell (1923)

Figure 228. Quiet Night: Last vestiges of flame

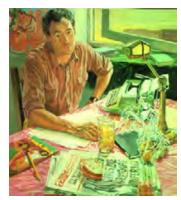
technology



Figure 231. *Still Life with Lamp* by Roy Lichtenstein (1976)



Figure 232. *Barry (the Poet)* by Janet Fish (1982)



Yet contemporary readers still cling to lingering forms. The very artifacts of the ancients have had a huge renaissance in the 21st century. Fireplaces, oil lamps, and particularly candles are thriving businesses this century, not for reading and writing per se, but for decoration and mood setting.

Nationally known for her wonderful pastels representing reading and writing events, Deborah DeWit Marchant (b. 1956) characterized nicely in two paintings our relatively newfound literacy relationship with candles, firelight and electricity (Figures 233-234). Remarkably, Marchant's extensive oeuvre includes many stunning scenes of contemporary literacy in action. She feels she is successful as an artist when she can "capture what readers and writers feel" (DeWit Marchant, 2011). Indeed, she expertly pictures *situated literacy* at its best in the 21st century, depicting with feeling our literate Western world across different purposes, domains, habits, participants and beliefs and values.



Figure 233. Evenings at Home by Deborah DeWit Marchant

Figure 234. Friday Nights by Deborah DeWit Marchant



Summary and Conclusions

This completes the *painted story* of lens and light and how each has extended the life of readers into the night and into old age. For those who were condemned to a distressingly blurry world, and, indeed, a painfully dim one after sunset (even *with* oil lamps and candlelight), these inventions were a godsend for better sight of the written word.

What does this survey of paintings and literacy history tell us about the relationship of *lens, light and literacy*?

Above all, it underscores how the technological development of vision aids and artificial lighting was *driven by literacy*. Major turning points in reading/writing history include the (a) the gradual evolution from an oral to a written culture and subsequent change from reading out loud in groups to silent reading alone; (b) the invention of the printing press; (c) the 'reading revolution' at the end of the 18th century; and (d) the "industrialization of the book and advent of mass literary culture" beginning in the 1830s (Lyons, 2010, p. 10). The last three were particular watersheds of progress for artificial lighting and eyewear. With the resulting surges in literacy rates and access to more reading materials and books came increasing demand for better ways to "see and produce text" and rapid advances in vision enhancement and lighting tools.

What a long, long road it was, however, to keen eyesight and illumination for readers and writers! Thousands of years brought agonizingly slow development

- 1. From the ancient's mirror, glass globe, and reading stone, to the handheld single reading lens, quizzer, and monocle, and finally to nose-, temple-, and ear-fitting eyeglasses; and
- 2. From antiquity's open flame of firelight, burning brand, oil lamp and candle, to whale, kerosene and gas burners, and at last to the flameless electric light.

Nevertheless, the evolution of both lens and light defied linearity. Pince-nez spectacles popular in the early 20th century were throwbacks to the original bridge nose glasses developed in the late 13th century. Roman oil lamps were more advanced than those used

in the American colonies. The modern versions of the medieval handled magnifier and ancient domed reading stone are still in use today.

As institutions, Western religions, and especially the Catholic Church, were seminal in the development of eyewear, but did little to advance lighting technology. In fact ancient oil lamp and candle technology is still very much a part of ceremonial and ritualistic aspects of all three Western religions today, having very little to do with vision improvement.

Of course in most instances, the educated and the upper echelons of society benefited first, before the technologies of light and lens spread to the masses. Brox (2010) suggested, "As new forms of illumination [and vision aids] overtook the old, they competed with one another in ways that stratified society and intensified the separateness of countryside and city, household and industry" (p. 58)—including readers and non-readers.

While many vision and illumination challenges still remain in the 21st century (see Footnote ³⁷⁾, eyeglasses, artificial lighting, as well as literacy, are technologies (at least in the West) that have moved to the realm of the commonplace, the ubiquitous, the socially and culturally invisible. Whereas lens, light, and literacy belonged to the "special" over the centuries after their invention, they now reside with the everyday and mundane. The rarity with which contemporary artists paint literacy artifacts of lens and light or for that matter, people just reading and writing, suggest how commonplace they are in the modern world, their uniqueness being clearly a story of the past (see Footnote ³⁸).

In addition to a visual chronicle of the history of lens and light, what do the 200+ artistic works tell us about literacy practices?

A caveat is in order here. In paintings, we see *who* is using the written text and, to some extent, *how* they are interacting with them. We also get information about *what* is in the picture and *when* and *where* the event took place, often suggested by the title, date and

country of origin. However, the painting is a snapshot of a dynamic process frozen in time (a visual bite, so to speak) and we can only speculate as to the subtext (the implicit or metaphorical meaning).

Within these limitations and others (see Footnotes ^{39 and 40}), the artistic representations of lens and light across the centuries bring to life a broad array of clearly changing literacy practices. The sampling of artistic works here reflect a definitive microcosm of a larger corpus of some 9000 literacy paintings (identified to date) that portray reading and writing acts and associated artifacts (Figures 1-6). Through artists' eyes we can see and document varying purposes, domains, habits, participants; and values/beliefs as to what it meant to be literate—indeed, *situated literacies*: the context giving meaning to behaviors in a long line of unique

Figure 235. *Rhetoricians at a Window* by Jan Steen (1662)



snapshots of periods, places and people.

As to *why people read and wrote*, this historical survey suggests that religious devotional intent (Figure 73, 81), enlightenment (Figure 61) or Biblical scholarship (Figures 17, 18, 66, 147) were paramount, particularly from medieval times through the 17th century when more secular purposes abounded such as communication through letter writing (Figure 149), universal public education (Figure 138) and personal academic and professional pursuits (Figures 126, 148, 188). While we think of leisure reading as a modern phenomena, paintings actually showed reading for pleasure gained prominence in the Dutch genre movement of the 1600s with dramatic scenes of light and shade involving group amusements of merry-making, drink and music (Figure 189 with artificial light and Figure 235 with natural light).

As to *how people read and interacted with text*, the many art works bare out humankind's slow evolution from an oral to a silent print culture. Scenes of reading aloud in groups (Figures 61, 65, 74, 152, 194) were popular through the 19th century. (See Dowhower, 2006, for a survey of oral reading paintings). Although images of solitary figures lost in a book (Figures 140,148), particularly philosophers studying or monks meditating, appeared in the 1600s, it is often difficult to tell if they are reading aloud or to themselves. Not until the beginning of the 20th century can we infer from the images with some confidence that silent reading was the preferred modality (Figures 229 and 230).

As to *the actual readers/writers*, artists painted, for the most part, those who had "social, cultural and economic capital." Not surprisingly, men in general were the most advantaged and were pictured as the immediate recipients of the new inventions to improve sight of written text.

From the early Christian era, only male biblical characters and saints were shown reading and writing by artificial light—and even anachronistically with glasses from the late 1300s. By the latter part of the 11th century famous real-life clergy and aristocracy reading by the light of candles or lamps (such as Sabas and the Emperor in Figure 180) began appearing in manuscript illuminations; and of course by the mid 1300s, Tommaso painted his famous fresco with the first representation of spectacles on the nose of a monk that died 22 years before they were invented (Figure 62). Males were the first to be pictured using single reading lenses (Figures 28-32), head and cap spectacles (Figure 82), quizzers and monocles, and purchasing double or single lenses at public vendors in the early 1500s (Figure 116).

If the number of paintings is any indication, women, for the most part, were disenfranchised from the reading/writing process and optical tools for centuries. As with spectacles (Figures 80, 81), there are no significant paintings of women (including saints) reading at night until first quarter of the 17th century; Gerrit van Honthorst's (1592-1656) superb rendering of an *Old Woman Examining a Coin by Lantern* (1623) being one of the first (Figure 236) and doubly significant to this discussion since the picture has early representations of *both* bow wire spectacles and candlelight.

Artificial lighting associated with women reading became extremely popular at the end of the 19th century, a result of the wave of fascination with the female sex by artists who portrayed them in scores of paintings romantically enjoying books in softly lit domestic interludes (Figures 210, 212, and 215), as well as lush shaded outdoor scenes (Figure 144). As to eyewear, old prejudices have carried over from centuries of generally negative attitudes about bespeckled females. Females, even today, rarely are pictured wearing glasses in artistic works (as well as photographs) and when they are, the women are usually older (Figures 131,150).

Perhaps the most revealing, is tracing the threads of literacy practices through the venues *where people read and wrote* over the ages. The dynamic changes across

Figure 236. *Woman Examining a Coin by Lantern* (1623) by Honthorst



settings suggested the ever-expanding nature of literacy from the advantaged to the masses, the religious to the secular, and public to domestic domains.

The first literacy settings depicting artificial light sources were the early medieval scriptoriums of the Evangelists (Figure 168) who composed at elaborate desks scattered with writing instruments. These scenes slowly transformed into the singular monastic cells of the late Middle Ages with mirrors and lenses (Figures 18, 29, 62) and the cluttered scholar's study of the Renaissance and Baroque periods (Figures 19, 164, 166, 199); finally morphing into the modern book-filled study of the 20th century (Figures 121, 122, 217) and the contemporary office of today (Figure 232).

Other than religious scriptorium scenes of reading and writing, those in actual churches were rare until the 1300s, first appearing in illuminated manuscripts (Figures 64, 65, 169, 181). The education of the clergy and the aristocracy at universities and church schools (Figure 179) was a particularly common scene in miniatures of this time, mirroring the rise of higher educational institutions in France, Italy and England. Dutch popularization of genre scenes of *peasant* schools in the mid-1600s showed literacy as an educational tool in the every daily life of the masses (Figure 138) for the first time.

The Flemish and Dutch art of the mid-1600s also was important in the initial depiction of literacy in domestic interiors (Figure 149), themes of which were later repeated in the idealized portraits of women and family life reading by the firelight, candle or lamp of the late 19th and early 20th centuries. Images of shared literacy in public eateries and cafés in the mid-to-late 19th century (Figures 51,194, 206 and 208) pointed to the rising distribution of alternative forms of information such as broadsheets, newspapers and magazines and underscored reading aloud as a secondary yet enduring modality (Dowhower, 2006).

Pope Gregory in the 6th century CE argued the didactic function of Christian narrative art saying that "the image was for simple men what the word is to those who can read." In 1025, the Synod of Arras supported this view, decreeing, "illiterate men can contemplate in the lines of a picture what they cannot learn by means of the written word" (as cited in Kypiotis, 2010). Isn't it ironic that for literates in our modern day and age, "the lines" of paintings have important stories to tell about the history of literacy and its artifacts, ones that cannot be "learned" or gleaned altogether from the written word?

References

- Alan. (2008, January 24). Re: Fact: Not everyone can wear pince-nez. *Pince-Nez Renaissance* [Web log comment]. Retrieved from <u>http://pincenez1.blogspot.com/2008/01/fact-not-everyone-can-wear-pince-nez.html</u>
- Alan. (2010, April 6). Re: Who wore pince-nez? *Pince-Nez Renaissance* [Web log comment]. Retrieved from <u>http://pincenez1.blogspot.com/2010/04/who-wore-pince-nez.html</u>
- Ambrose, S. E. (1991). *Eisenhower: Soldier and president*. New York: Simon and Schuster.
- Andressen, B. M. (1998). Brillen: Vom gebrauchsartikel zum kultobjekt / Spectacles: From utility article to cult object. Stuttgart: Arnoldsche Art Publishers.
- Ascaso, F. J. & Bosch, J. (2010). Uveitic secondary glaucoma: Influence in James Joyce's (1882-1941) last works. *Journal of Medical Biography*, 18, 57-60. doi: 10.1258/jmb.2009.009064
- Avrin, L. (1991). Scribes, script and books: The book arts from antiquity to the Renaissance. Chicago: Art Library Association; London: The British Library.
- Bachelard, G. (1988). *The flame of a candle* (J. Caldwell, Trans.). TX: Dallas Institute Publications.
- Baron, D. (1999). From pencils to pixels: The stages of literacy technology. In G. E. Hawisher and C. Selfe, (Eds.), *Passions, pedagogies and 21st century technologies* (pp. 15-33). Logan, UT: Utah State University Press; Urbana, IL: NCTE.
- Barton, D., Hamilton, M., & Ivanic, R. (2000). *Situated literacies: Reading and writing in context*. New York: Routledge.
- Beckett, S. W. (1998). Sister Wendy's book of saints. London: Dorling Kindersley.
- Beyer, A. (2003). *Portraits: A history* (S. Lindberg, Trans.). New York: Harry N. Abrams.
- Boehm, B. D. (1994). The books of Florentine illuminators. In *Painting and illumination* in early Renaissance Florence 1300-1450 by Kanter, L. B., Boehm, B. D., Strehlke, C. B., Freuler, G., Thruman, C. C. M., & Palladino, P. New York: Metropolitan Museum of Art, Harry Abrams distributor.
- Boehm, M. (2006, December 16). 'Blinking Sam' to be in full view. Los Angeles Times. Retrieved from <u>http://articles.latimes.com/2006/dec/16/entertainment/et-blinking16</u>
- Boyer, S. (2005). Retrieved from <u>http://www.louvre.fr/llv/oeuvres/detail_notice.jsp?CONTENT%3C%3Ecnt_id=10</u> 134198673225680&CURRENT_LLV_NOTICE%3C%3Ecnt_id=101341986732

25680&FOLDER%3C%3Efolder_id=9852723696500828&baseIndex=138&bmL ocale=en

- Boyle, B. M. (2002). *Early lighting 2 in America: Betty lamps and grease lamps*. Retrieved from Rams Horn Studio website: http://www.ramshornstudio.com/early_lighting_2.htm
- Brands, H. W. (2005). Andrew Jackson: His life and times. New York: Doubleday.
- Brox, J. (2010). *Brilliant: The evolution of artificial light*. New York: Houghton Mifflin Harcourt.
- Bryson, B. (2010). At home: A short history of private life. New York: Doubleday.
- Budgen, F. (1934/1967). James Joyce and the making of Ulysses (4th ed.). Bloomington: Indiana University Press.
- Burckhardt, J. (1947). Rembrandt and Van Dyke: Zwei vorträge. Bern: A. Scherz.
- Chaplin, J. E. (2006). *The first scientific American: Benjamin Franklin and the pursuit of genius*. New York: Basic Books, Perseus Book Group.
- Clute, E. (1941, September). Flashback: Lamps and illuminants. *American Collector Magazine*. Retrieved from <u>http://www.collectorsweekly.com/articles/lamps-and-</u> <u>illuminants/</u>
- College of Optometrists. (2011). *Rivet spectacles*. Retrieved from The MusEyeum Online Exhibition Spectacle Gallery, British Optical Association Museum website: <u>http://www.college-optometrists.org/en/knowledge-</u> centre/museyeum/online_exhibitions/spectacles/rivet.cfm
- College of Optometrists. (2011a). *Everybody dies*. Retrieved from The MusEYEum On-line Exhibition Art Gallery, British Optical Association Museum website: <u>http://www.college-optometrists.org/en/knowledge-</u> centre/museyeum/online_exhibitions/artgallery/memento.cfm
- College of Optometrists. (2011b). *A curtain fell upon him*. Retrieved from The MusEYEum On-line Exhibition Art Gallery, British Optical Association Museum website: <u>http://www.college-optometrists.org/en/knowledge-</u> centre/museyeum/online_exhibitions/artgallery/reynolds.cfm
- College of Optometrists. (2011c). *Antiques in use*. Retrieved from The MusEYEum On-line Exhibition Art Gallery, British Optical Association Museum website: <u>http://www.college-optometrists.org/en/knowledge-</u> centre/museyeum/online_exhibitions/artgallery/antiques.cfm
- College of Optometrists. (2011d). *The 'inventor' of bifocals?* Retrieved from The MusEYEum On-line Exhibition Art Gallery, British Optical Association Museum website: <u>http://www.college-optometrists.org/en/knowledge-</u> <u>centre/museyeum/online_exhibitions/artgallery/bifocals.cfm</u>
- Corson, R. (1967). Fashions in eyeglasses. London: Peter Owen.
- Crestin-Billet, F. (2004). Collectable eyeglasses (J. Sty, Trans.). Paris: Flammarion.
- Danielsson, B. (1966). Gauguin in the south seas. Garden City, NY: Doubleday.
- Davidson, D. C. & MacGregor, R. J. S. (2002). *Spectacles, lorgnettes and monocles*. Buckinghamshire, UK: Shire Publication, Ltd.
- Davies, D. (2003). *El Greco*. NY: Metropolitan Museum of Art; London: National Gallery.
- Daxecker, F. (1997). Representations of eyeglasses on Gothic winged altars in Austria. Documenta Opthalmologica, Advances in Ophthalmology, 93 (1-2), 169-188.

- De Beaune, S. A., & White, R. (1993). Ice age lamps. *Scientific American Monthly*, 266(3), 108-113.
- De Hamel, C. (1986). A history of illuminated manuscripts. London: Phaidon Press.
- De Rynck, P. (Ed.). (2004). *How to read a painting: Lessons from the old masters*. New York: Harry N. Abrams.
- DiLaura, D. L. (2006). A history of light and lighting: In celebration of the century of the Illuminating Engineering Society of North America. New York: Illuminating Engineering Society of North America.
- DeWit Marchant, D. (2011, November 11). Personal communication.
- Dowhower, S. L. (2006). Painted literacy: Reading aloud rituals. *American Reading Forum Yearbook*. Retrieved <u>http://www.americanreadingforum.org/yearbook/yearbooks/06_yearbook/volume</u> 06.htm#Dowhower
- Drewry, R. D. (2007). *History of glasses: What man devised that he might read*. Retrieved from Teagle Optometry Website: <u>http://www.teagleoptometry.com/history.htm</u>
- Ebert-Schifferer, S. (1999). Still life: A history. New York: Harry N. Abrams, Inc.
- Ellmann, R. (1982). James Joyce (2nd ed.). Oxford: Oxford University Press.
- Enoch, J. M. (1998, April). The enigma of early lens use. *Technology and culture*, 39(2) 273-291. Enoch, J. M. (2007, May-June). Archeological optics: The very first known mirrors and lenses. *Journal of Modern Optics*, 54 (7-9), 1221-1239.
- Enoch, J. M. (2006). History of mirrors dating back 8000 years. *Optometry and Vision Science* 83(10), 775-781.
- Enoch, J. M. (2007, May 10-June 15). Archeological optics: The very first known mirrors and lenses. *Journal of Modern Optics*, 54(7-9), 1221-1239.
- Enoch, J. M. (2009). The fascinating early history of optics! Archaeological Optics 2009; our knowledge of the early history of lenses, mirrors and artificial eyes! Invited Paper [7428-02]. Proceedings-spie the International Society for Optical Engineering, 7428 742803 British Library Series. doi:10.1117/12.828453
- Eshleman, C. (2003). Juniper fuse: Upper Paleolithic imagination and construction of the underworld. Middletown, CT: Wesleyan University Press.
- Eyeglasses. (2011). *Thomas Jefferson Encyclopedia*. Retrieved from The Jefferson's Monticello website: <u>http://www.monticello.org/site/research-and-collections/eyeglasses#</u>
- Fischer, S. R. (2003). A history of reading. London: Reaktion Books.
- Fleishman, D. A. (2011). Antique Spectacles and Other Vision Aids. *The On-Line Museum and Encyclopedia of Vision Aids*. Retrieved from <u>http://www.antiquespectacles.com/</u>
- Fleishman, D. A. (2011a). *Eyeglasses through the ages*. Retrieved from the Antique Spectacles and Other Vision Aids website: http://www.antiquespectacles.com/history/ages/through the ages.htm
- Fleishman, D. A. (2011b). *Rivet spectacles—The earliest style*. Retrieved from the Antique Spectacles and Other Vision Aids website: http://www.antiquespectfleishacles.com/rivet_spectacles/rivets.htm
- Fleishman, D. A. (2011c). *Kloster Wienhausen*. Retrieved from the Antique Spectacles and Other Vision Aids website:

http://www.antiquespectacles.com/topics/wienhausen/wienhausen.htm

- Fleishman, D. A. (2011d). *The Edward Scarlett trade card*. Retrieved from Antique Spectacles and Other Vision Aids website: http://www.antiquespectacles.com/trade_cards/scarlett/scarlett.htm
- Fleishman, D. A. (2011e). *Benjamin Martin and his visual glasses*. Retrieved from Antique Spectacles and Other Vision Aids website: http://www.antiquespectacles.com/topics/martin/martin.htm
- Fleishman, D. A. (2011f). *Benjamin Franklin—Father of the bifocal*. Retrieved from Antique Spectacles and Other Vision Aids website: http://www.antiquespectacles.com/topics/franklin/franklin.htm
- Fleishman, D. A. (2011g). Scarlet focus mark at *The slide show of interesting associated images* at Antique Spectacles and Other Vision Aids. Photo retrieved from http://www.antiquespectacles.com/trade_cards/associated.htm
- Franklin Papers. (1751, November, 21). Letter to Susanna Wright: Volume 4. Digital Edition of the Papers of Benjamin Franklin, American Philosophical Society and Yale University website: Retrieved from http://www.franklinpapers.org/franklin/framedVolumes.jsp
- Franklin Papers. (1771, July 17). Letter to Jane Franklin Mecom: Volume 18. Digital Edition of the Papers of Benjamin Franklin, American Philosophical Society and Yale University website: Retrieved from

http://www.franklinpapers.org/franklin/framedVolumes.jsp

- Franklin Papers. (1784, August 21). Letter to George Whatley: Volume 37, unpub. 1784-85. Digital Edition of the Papers of Benjamin Franklin, American Philosophical Society and Yale University website: Retrieved from <u>http://www.franklinpapers.org/franklin/framedVolumes.jsp</u>
- Franklin Papers. (1785, May 23). Letter to George Whatley: Volume 37, unpub. 1785-86. Digital Edition of the Papers of Benjamin Franklin, American Philosophical Society and Yale University website: Retrieved from http://www.franklinpapers.org/franklin/framedVolumes.jsp
- Frugoni, C. (2003). Books, banks, buttons. New York: Columbia University Press.
- Getty (2007). Radiant darkness: The art of nocturnal light. Past exhibition at the Getty Center, April 24-July 22, 2007. Retrieved from the J. Paul Getty Museum website: <u>http://www.getty.edu/art/exhibitions/radiant_darkness/</u>
- Gibbs, R. (1989). Tomaso da Modena: Painting in Emilia and the March of Treviso, 1340-80. New York: Cambridge University Press.
- Gilbert, S. (Ed.). (1957). Letters of James Joyce. New York: Viking Press.
- Gowing, L. (Ed.). (1995). A history of art. New York: Barnes & Noble.
- Gurewitsch, M. (2009, March). Jan Lievens: Out of Rembrandt's shadow. *Smithsonian Magazine*. Retrieved from <u>http://www.smithsonianmag.com/arts-culture/Out-of-Rembrandts-Shadow.html</u>
- Haas, C. (1996). *Writing technology: Studies on the materiality of literacy*. Mahwah, NJ: Lawrence Erlbaum Associates.
- Hall, J. (1979). *Dictionary of subjects and symbols in art* (revised ed.). Boulder, CO: Westview Press
- Hamilton, R. (2000). Expanding the new literacy studies: Using photographs to explore literacy as social practice. In D. Barton, M. Hamilton, & R. Ivanic (Eds.), *Situated literacies: Reading and writing in context* (pp. 16-33). New York: Routledge.

- Handley, N. (2005, October 28). What is an Optician? What's in a name? Proceedings of the British Royal Literary and Scientific Institution, Vol. 10 (2006). Retrieved from http://www.brlsi.org/proceed06/science281005.htm
- Handy, M. P. (1876). Confederate make-shifts. In *Harper's Magazine: Making of America project: Vol. 52*, (pp. 576-580) [Google eBook]. Retrieved from <u>http://books.google.com/books?id=pOYvAAAAMAAJ&printsec=frontcover&so</u> urce=gbs ge summary r&cad=0#v=onepage&q&f=false
- Hapgood, H. (1900). Abraham Lincoln: The man of the people. New York: Macmillan.
- Hemingway, V. (2004). *Running with the bulls: My years with the Hemingways*. New York: Ballantine Books.
- Hern, C. (2004, June 1). *Quizzing glasses*. Retrieved from http://www.candicehern.com/collections/04/eyeglass.htm
- History of Candles. (2010). Retrieved from National Candle Association website: http://www.candles.org/about_history.html
- Holtmann, H. W. (1980). A short history of spectacles. In W. Poulet, Atlas of the history of spectacles (pp. vii- xxi). Bonn: Wayenborgh.
- Hough, W. (1902/1992). *The development of illumination*. Washington DC: Government Printing Office and Rushlight Club.
- Hustvedt, S. (2005). *Mysteries of the rectangle: Essays on painting*. New York: Princeton Architectural Press.
- Hyman, L. (2007, July-August). Myopic and hyperopic refractive error in adults: An overview. *Ophthalmic Epidemiology*, 14(4), 192-197. doi: 10.1080/09286580701535517
- Ilardi, V. (2007). *Renaissance vision from spectacles to telescopes*. Philadelphia, PA: American Philosophical Society.
- Irving, W. (1854). *The works of Washington Irving*, Vol. XI. Oliver Goldsmith. New York: G. P. Putnam.
- Isaacson, W. (2003). *Benjamin Franklin: An American life*. New York: Simon & Schuster.
- Kaplan, R. M. (2008, August). Doctors, disease and James Joyce. Australian Family Physician, 37(8), 668-9.
- Kelley, A. (1978). *Lenses, spectacles, eyeglasses, and contacts: The story of vision aids.* New York: Thomas Nelson Inc.
- Kellsey, C. M. (1999). Lecto divina: Nuns and reading in the sixth and seventh centuries (Master's thesis). Retrieved from Jan Jose State University SJSU ScholarWorks: http://scholarworks.sjsu.edu/etd_theses/1934/
- Klawans, J. (2010, March 31). Was Jesus' last supper a seder? *The Christianity*. Retrieved from <u>http://thechristianity.wordpress.com/2010/03/31/was-jesus%E2%80%99-last-supper-a-seder/</u>
- Kosters, B. (2010, May 27). Interview with Chuck Close. *F Newsmagazine*. School of the Art Institute of Chicago. Retrieved from http://fnewsmagazine.com/wp/2010/05/interview-with-chuck-close/
- Kypiotis, L. (2010, June). *To see...catalogue essay*. Retrieved from the Pilgrim Project website: <u>http://www.thepilgrimproject.org/?p=472</u>
- Leaves of Gold. (2011). Book of Hours for Sarum Use and Gallican Psalter with Canticles (Pembroke Hours). Treasures of Manuscript Illumination from

Philadelphia Collections. Retrieved from

http://www.leavesofgold.org/gallery/psalters/psalter09.html

Lipson, N. (2008, February). One of mankind's greatest inventions. *Mivision*, 20-21. Retrieved from

www.antiquespectacles.com/newsworthy/pdf_files/feb_2008_mivision.pdf

- Literary Clubs in the US. (2009, January 12). Retrieved from the Indianapolis Literary Club website: <u>http://www.literaryclub.org/id18.html</u>
- Livingstone, M. S. & Conway, B. R. (2004, September 16). Was Rembrandt stereoblind? *New England Journal of Medicine*, 351, 1264-1265.
- Louvre. (2003, October 1). Paintings: Latest Acquisitions: Saint Jerome meditating by Jan Cornelisz Vermeyen.

http://www.louvre.fr/llv/oeuvres/detail_actualite.jsp?CONTENT%3C%3Ecnt_id= 10134198673211764&CURRENT_LLV_FICHE%3C%3Ecnt_id=101341986732 11764&FOLDER%3C%3Efolder_id=9852723696500764&bmLocale=en

Luckiesh, M. (1920). Artificial light. New York: The Century Co.

- Lyons, M. (2010). A history of reading and writing: In the western world. New York: Palgrave Macmillan.
- Macfarlane, A. & Martin, G. (2002). *Glass: A world history*. Chicago: University of Chicago Press.
- Maddox, B. (1988). Nora: The real life of Molly Bloom. Boston: Houghton Mifflin.
- Manguel, A. (1996). A history of reading. New York: Penguin Books.
- Marmor, M. F. & Ravin, J. G. (2009). *The artist's eyes: Vision and the history of art*. New York: Abrams.
- Martin, G. D. (2007). *Tefillin (phylacteries)*. Retrieved from http://aoal.org/bt/tefillin.html
- Meiss, M. (1970). *The great age of fresco: Discoveries, recoveries and survivals.* New York: George Braziller in association with The Metropolitan Museum of Art.
- Mellby, J. L. (2008, November 12). Palatino's tools of handwriting. *Graphic Arts*, 1-3. Online publication by Princeton University Library. Retrieved from <u>http://blogs.princeton.edu/graphicarts/2008/11/palatinos_tools_of_handwriting.html</u>
- Meyers, J. (1985). Hemingway, a biography. New York: Harper & Row.
- Miller, R. C. & Solverson, J. F. (1992). *Student lamps of the Victorian era*. Marietta, Ohio: Antique Publications.
- Mitchell, R. (1969). *The study book of lamps and candles: The history of lighting*. London: Bodley Head.
- MusEYEum News 2 (2010, March 15). The man who wouldn't wear his spectacles. Vol. 1(2), 2. Online publication retrieved from the College of Optometrists website: <u>http://www.college-optometrists.org/en/utilities/document-</u> <u>summary.cfm/docid/0FB0E4BE-3048-216E-80888678A3AC5591</u>
- O'Dea, W. T. (1958). *The social history of lighting*. London: Routledge and Kegan Paul.
- Old Time Lamp Shop. (2007). *Betty lamps*. Retrieved from http://collectlamps.com/fat%20betty%20lamps.html
- Orr, H. (1985). Illustrated history of early antique spectacles. Kent, UK: Beckenham.

- Page, D. (2010, September 14). Notes on the text *From Sea to Sea* (March-September, 1889) by R. Kipling. Footnote, p. 446, line 15. Retrieved from http://www.kipling.org.uk/rg seatosea twentyone.htm
- Perry, D. H. (1969). *Out of darkness: A history of lighting*. Rochester, NY: Rochester Museum and Science Center.
- Pliny the Elder (C. 77 CE). *The Natural History*, Book XXXVII, Chapter 10. J. Bostock & H. T. Riley, Esq. (2010) available in print. Retrieved from <u>http://www.perseus.tufts.edu/hopper/text?doc=Perseus%3Atext%3A1999.02.0137</u> %3Abook%3D37%3Achapter%3D16
- Poulet, W. (1980). Atlas of the history of spectacles. Bonn: Wayenborgh.
- Robins, F. W. (1939). *The story of the lamp (and the candle)*. London: Oxford University Press.
- Rosen, E. (1956). The invention of eyeglasses. *Journal of the History of Medicine and Allied Science*, 11(1), 13-46; 182-218.
- Rosenthal, J. W. (1996). Spectacles and other vision aides: A history and guide to collecting. San Francisco: Norman Publishing.

Sambrook, J. (2009, February). Club (act. 1764–1784). Oxford Dictionary of National Biography, Oxford University Press online edition. http://www.oxforddnb.com/public/themes/49/49211.html

- Saywell, D. & Simon, J. (2004). *Complete illustrated catalogue, National Portrait Gallery*. London: National Portrait Gallery.
- Schneider, N. (1999). *Still life: Still life painting in the early modern period*. New York: Taschen.
- Sellers, C. C. (1962). *Benjamin Franklin in portraiture*. New Haven: Yale University Press; American Philosophical Society.
- Sheehan, G. (2004, April 6). Kipling and Medicine: Neurological Conditions, Kipling's eyesight problems. Retrieved from http://www.kipling.org.uk/rg_kipmedicine_1.htm

Shilling, D. A. (1993, December). How Rochester lamps helped light up the world. *The Crooked Lake Review*. Retrieved from

http://www.crookedlakereview.com/articles/67 100/69dec1993/69shilling.html

- Smith, F. (1988). Joining the literacy club. Portsmouth, NH: Heinemann.
- Spectacles and Sunglasses. (2005). Amsterdam: Pepin Press.
- Temple, R. (2000). *The crystal sun: Rediscovering a lost technology of the ancient world.* London: Century.
- Thomas Jefferson Papers. (1806, December 1). Letter and bill from John McAllister to Thomas Jefferson. Retrieved from Library of Congress website" http://hdl.loc.gov/loc.mss/mtj.mtjbib016628
- Thomas Jefferson Papers. (1806, November 12). Letter from Thomas Jefferson to John McAllister. Retrieved from Library of Congress website: http://hdl.loc.gov/loc.mss/mtj.mtjbib015576
- Thomas Jefferson Papers. (1808, November 16). Letter from Thomas Jefferson to John McAllister. Retrieved from Library of Congress website: http://hdl.loc.gov/loc.mss/mtj.mtjbib019310

Thomas, J. (2000). Victorian narrative painting. London: Tate Publishing.

Thornton, D. (1997). *The Scholar in his study: Ownership and experience in Renaissance Italy.* New Haven: Yale University.

- Totty, M. (2010, September 28). A different kind of eyeglasses. *Wall Street Journal*. Retrieved from http://nbsrocks.com/a-different-kind-of-eyeglasses
- Tusting, K., Ivanic, R., & Wilson, A. (2000). New literacy studies at the interchange. In D. Barton, M. Hamilton & R. Ivanic (Eds.), *Situated literacies: Reading and writing in context* (pp. 210-218). New York: Routledge.
- V&A. (2011). *Medieval monasteries*. Retrieved from the Victoria and Albert Museum website: <u>http://www.vam.ac.uk/content/articles/m/medieval-monasteries/</u>
- White, T. (2007, April 11). Eye diseases changed great painters' vision of their work later in their lives. *Stanford Report*. Retrieved from http://news.stanford.edu/news/2007/april11/med-optart-041107.html
- Willach, R. (2008). *The long route to the invention of the telescope*. Philadelphia: American Philosophical Society.
- Windsor Eyeglasses. (2011). Retrieved from the Eyeglassess Warehouse website: http://www.eyeglasseswarehouse.com/pages/windsor.html
- Wong, T. (2010, November 28). *The remediation of the visual* [Web log post]. Retrieved from ETEC540: Text Technologies website: http://blogs.ubc.ca/etec540sept10/2010/11/28/the-remediation-of-the-visual/

Wood, G. S. (2004). Americanization of Benjamin Franklin. New York: Penguin Press.

World Lingo. (2011). Mauritius Rotunda. Original Wikipedia article in German and retrieved from <u>http://de.wikipedia.org/wiki/Mauritiusrotunde</u> Translation retrieved from Multilingual Archive and World Lingo website at http://www.worldlingo.com/ma/dewiki/en/Mauritiusrotunde#Weblinks

Footnotes

² The British Museum originally identified this as a "magnifying glass" (not a mirror) on its website. Based on the lack of archeological evidence of transparent magnifying lens this size or any known paintings of them in this time period, I believe Beauvais is using a magnifying "mirror," much like that of St. Isnardo.

³ Fleishman suggests that some experts think this actually may be a pharmacist's trowel instead of a single lens; while others, like Willach (2008) contend that it is the first extant dioptrical correction aid representation. For Fleishman's comment click on the pharmacist image at

http://www.antiquespectacles.com/slide shows/non vision aids/nva.htm#

⁴ The first major shift in magnification technology for reading and writing came in the late 20th century with the computer and digital revolution in which the size of print could be manipulated by changing the font or letter size. Perhaps even more revolutionary is the 21st century's *touch technology* where double tapping, finger stretching, and virtual magnifying enlarge the letter sizes for easy viewing on small handheld devices like smart phones, iPods, and iPads.

⁵ The oldest painting I have been able to find of a hand magnifier is one pictured among alchemist's tools in a miniature from a French 14th illuminated manuscript, *The Book of Abraham, the Jew,* attributed to Nicolas Flamel (1330-1418), Paris, Bibliotheque Nationale de France, MS. Fr. 14765, fol. 1.

¹ Martin's (2007) work suggested the actual use of magnifying devices in ancient times is problematic and that severe myopia or flexible young eyes could enable a scribe to write miniature continuous text.

⁶ Often a contemporary reader will require three different vision prescriptions; one for close reading, one for medium distance as with a computer screen, and another for print far away. One modern solution has been trifocals —another more recent is Superfocus Glasses (see Footnote 37).

⁷ The only Italian pair of rivet spectacles ever found was from Florence. The artifact is made of thin bone and is medium brown in color. An image can be seen at the Antique Spectacles and Other Vision Aids website:

http://www.antiquespectacles.com/rivet_spectacles/rivets.htm

⁸ Originally the Salisbury nuns at the Church of St. Martin lived under Roman Catholic Cistercian rule until the 16th century when the convent converted to Protestantism.

⁹ Two known paintings exist with spectacles associated with women saints: (a) St. Anne was pictured with nose eyeglasses in her lap on a book in *The Holy Kinship* by Geertgen tot Sint Jans at the Amsterdam Kijksmuseum; however, the spectacles were not in the original of 1475 and were subsequently removed from the painting upon recent restoration; and (b) St. Mary was depicted with the same spectacle type resting behind her prayer book on a shelf in *The Annunciation* by Juame Huguet painted sometime during the second part of the 15th century (Museo Diocesano de Tarragona, Spain).

¹⁰ *The Golden Legend* is a collection of tales of the saints by Dominican cleric Jocabus de Voragine (1228/9-1298). An important source for Christian iconography since the Middle Ages, artists have borrowed liberally from this 13th century book.

¹¹ Sometimes the figure of Jesus is included holding Mary's soul. A younger John is often given prominence since he was charged to care for the Virgin. Peter usually stands over Mary, holding an open book from which he is administering Holy Communion. If she is still alive, the Virgin may hold a lighted candle to symbolize the Christian faith (Hall, 1979).

¹² Two other works during the same time period show an apostle using spectacles as a magnifier: *Death of the Virgin* (c. 1500) by Maestro De L Sisla at Museo del Prado in Madrid and *Death* (1475) by Martin Schongauer at the British Museum, London.

¹³ I have had trouble confirming this claim. The image cited by Manguel is the very same *Death of Mary* scene on the Albrecht Altarpiece, one of 22 panels of the life of Mary by the Albrecht Master executed between 1437-1439 at the Klosterneuburg Monastery. Leopold III founded the church in 1114, which was built on an older church foundation at the site of an earlier Roman fortress. A website outlining Stift Klosterneuburg's 900 year history mentions nothing about an 11th century *Death of Mary* painting. See

http://www.augustiniancanons.org/Klosterneuburg/a history of stift klosterneubur.htm

¹⁴ With the caveat that it can be difficult to tell rivet from bow spectacles in artwork because often the nose area is obscured, the earliest rigid bridge image I have found to date is represented in Van Eyck's *The Virgin and Child with Canon van der Paele* in 1434 (Figure 73).

¹⁵ The earliest surviving painting that I have been able to find of a woman actually reading and wearing spectacles is Jan Lievens' s *Old Woman Reading* (1621-23) followed by Honthorst's Old *Woman Examining a Coin* (1623) and *Rembrandt's Mother (Portrait of the Artist's Mother)* in 1629. Art historians disagree over who actually painted the last work. Bridgeman Art Library lists the work by Rembrandt, whereas Sister Wendy

Beckett (1999, p. 268) stated that work was downgraded to the lesser artist, Lievens. Other scholars think that the painting was a joint effort by both artists.

¹⁶ Rosenthal (1996) suggested that this practice was less than comfortable because "pressing the glasses on the lower part of the nose caused obstruction of the nasal passages, with accompanying voice change and respiratory problems" (p. 236).

¹⁷ Neil Handley (2006), Curator at the BOA Museum, suggested that the advertising trading card owned by the College of Optometrists indicated that Scarlett swirls were initially made in the 1720s (c. 1727-30). Also see <u>http://www.college-optometrists.org/en/knowledge-centre/museyeum/online_exhibitions/spectacles/side.cfm</u>

However, Fleishman (2011d) found evidence in 2007 at the Bodleian Library that the swirls were possibly available as early as 1714. The implication here is that the first hinged spectacles with sides had to be invented as early as 1714 and no later than 1727. See <u>http://www.antiquespectacles.com/trade_cards/scarlett/scarlett.htm</u>

¹⁸ Dr. David Fleishman owns what is thought to be the oldest DATED sliding adjustable sides (1805), an invention believed to have occurred around the turn of the 19th Century. The spectacles (Figure 97) were originally in the Hugh Orr Collection.

¹⁹ Shagreen is the rough untanned granular skin of a rayfish or shark. Popularized in 18th century France, eyeglass cases (as well as other luxury items such as snuffboxes, wig-holders, and perfume containers) were covered with this type of scaly leather usually dyed green. See <u>http://en.wikipedia.org/wiki/Shagreen</u> and <u>http://www.antiquespectacles.com/glossary/glossary.htm</u>

²⁰ Originally in the Hugh Orr Collection, Dr. Fleishman now owns what is thought to be the world's oldest extant Franklin bifocal spectacles. Currently on loan to the Independence National Historical Park, this pair of split-lens will be displayed at the Franklin Museum in Philadelphia after touring the US as part of the Franklin Tercentenary Exhibition called *Benjamin Franklin: In Search of a Better World* (2007-2011).

²¹ See Sellers (1962) for a comprehensive listing of Franklin portraits in which the great man wears spectacles.

²² Charles Willson Peale did a second painting of Franklin with bifocals in 1789 just before the inventor's death. The painter wanted to do it in life, but Ben was so ill that Peale had to base this 2nd portrait on the 1785 original (Wood, 2004, p. 213).

²³ The smaller folding pair kept in a silver case had short sides and cup-shaped finials. Made by Burt and Willard these glasses are quite rare. They have a patent date stamped on the back of the nose bridge, according to Dr. David Fleishman of Antique Spectacles and Other Vision Aids Online Museum. The larger gold-rimmed spectacles with adjustable sides have an inscription on one of the sidearms that says "A. Lincoln, presented by Ward H. Lamon."

²⁴ Monet's oeuvre depicting literacy events were executed in his 30s and 40s between 1870 and 1887. The artist's style was more detailed with clearer lines and more vibrant colors than later paintings. All were outdoor scenes with women reading, but according to common practice, no spectacles were in sight!

²⁵ "A gig was a small light carriage pulled by one horse. It was lit at night by two oil lamps with thick glass, called gig-lamps. These gave a double halo effect in the dark as it approached. Today some types of glasses can be called gig-lamps when they have

very thick glass like the original lamps...." Retrieved from WordReference.com: http://forum.wordreference.com/showthread.php?t=867897

²⁶ According to the Vintage Eyeglass Warehouse website, plastic browline glasses of this era are hard to find because the plastic tended to shrink over time; and because the metal frames are solid, most frames cracked. See

http://www.eyeglasseswarehouse.com/pages/plastic-menbrowline.html

²⁷ The phrase "radiant darkness" is from a small 2007 exhibition entitled *Radiant Darkness: The Art of Nocturnal Light* at the J. Paul Getty Museum in CA, featuring Gerrit Dou and other artists' special skill in chiaroscuro. See the Getty website overview at <u>http://www.getty.edu/art/exhibitions/radiant_darkness/</u>

²⁸ Artist Quint Buchholz was diagnosed when he was a child with a vision problem in which his eyes were poorly aligned (called "walleyed" or "stereo blind"). Livingstone & Conway (2004) believe Rembrandt was stereo blind just as Buchholz was. This condition causes the person to have no depth of vision and see everything flat. Thus, Buchholz as a painter, finds it easy to translate three dimensional impressions of reality into two dimensional images and turns an eye defect into an advantage (see http://www.quintbuchholz.de/en/articles/how-it-all-began.html

²⁹ See the article *Lighting* from the *Canadian Encyclopedia* website for a discussion of the three time periods in the evolution of lighting. Retrieved from <u>http://www.thecanadianencyclopedia.com/index.cfm?PgNm=TCE&Params=A1ARTA00</u> 04681

³⁰ A cresset stone was a flat stone (often square) with single or multiple cupshaped hollows. Multiple cups looked like an egg box. Most common to church or monastery sites in Great Britain, cressets were fill with oil or tallow with a floating wick to produce a primitive form of artificial light. According to Dr. Michael Day of the University of Bath, the fine Wool cresset stone is carved from Purbeck marble, not really a marble but a type of limestone that contains densely packed fossil shells. Quarried near Wool, it was used extensively in churches of the Middle Ages to decorate fonts, grave stones and column shafts, as seen at the Salisbury Cathedral.

³¹ Splinters were made of narrow splits of wood systematically cut and tied together. Made with resinous wood (especially pine) or sometimes treated with combustible material, they were in effect, skinny torches. Probably developed by the ancient Egyptians, *rushlights* were actually a miniature torch formed by dipping the peeled rush plant in fat or grease. We think of them as the first primitive candle.

³² On a personal note, while I was finishing this paper, a storm knocked out our electric power for 24 hours. In a stroke of irony, I spent two hours at night editing a printed copy of this manuscript by candlelight. With my tired aging eyes, it took the light of five candles for me to decently see the text and even that caused me some eyestrain and a headache!

³³ In addition to "coal oil," kerosene was also referred to as "paraffin" by the British or just "petroleum" by others on the Continent.

³⁴ Like James Joyce, Monet and others, Cassatt was an artist who was devastated by failing vision and eye disease. In fact, her ocular problems forced her to stop painting in 1915 and by 1918 she could no longer read. Historians think that she painted exclusively in pastels at the end of her career because they allowed her to accommodate her vision loss with more fuzzy lines and fewer details, particularly in facial representations (see Marmor & Kavin, 2009, pp. 160-163).

³⁵ *The Long Island Farmer*, Jamaica, NY, March 15, 1895, p. 4. Retrieved from http://antiqueclippings.blogspot.com/2008/06/rochester-lamp-company-1895.html

³⁶ Much of Quint Buchholz's oeuvre expresses a fascination with books, light and reading. Some 25 of his paintings have unique messages about what it means to be literate. Perhaps more than any artist, he represents an intriguing interplay between impaired eyesight, light and literacy (See Footnote 28).

³⁷ The most current 21st century eyewear technology solution to poor vision is called *Superfocus* spectacles invented by Stephen Kurtin and produced by Superfocus, LLC out of California. These dual-lens glasses (which look amazingly like James Joyce's Empire Ovals) manually adjust for individual prescriptions for hyperopia, presbyopia, myopia, and/or astigmatism to "give clear undistorted vision whether reading a book, working on the computer or looking into the distance" (Totty, 2010). Superfocus eyewear has been awarded several prestigious industry awards, including the *Wall Street Journal 2010 Innovations Silver Award* and is being used by the astronauts on Discovery's final spaceflight (Spring, 2011) and aboard the International Space Station. Retrieved from http://www.superfocus.com/superfocus-certified-by-nasa-for-astronauts

³⁸ Compared to other eras, artists of the 20th century have produced few paintings representing either literacy or vision aids. With some exceptions, it is very difficult to find contemporary art works with people reading and writing, let alone wearing spectacles at the same time. Possible reasons for this shift are (a) the decline of figurative art— the genre of representational painting was out of vogue for most of the era; and (b) the age of pervasive and cheap photography and digital technologies have virtually killed the once widespread middle or upper class portraiture painting (of real people) dating back to the Renaissance; and (c) like digital photography, spectacles are common place, cheap and ubiquitous.

³⁹ As Hamilton (2000) suggests, "visible literacy events are just the tip of an iceberg: literacy practices can only be *inferred* from observable evidence because they include invisible resources, such as knowledge and feelings; they embody social purposes and values; and they are part of a constantly changing context, both spatial and temporal" (p. 18).

(p. 18). ⁴⁰ Another caution has to do with the artists themselves. Painters crafted works with literacy at their center with biases, motives and expectations ruled by the era and society as a whole, and often patrons (who were paying them) in particular. Some literacy practices may well have been artificially constructed for show or public display. In addition, artists used conventions that were often exaggerated, unrealistic or just plain false (e.g., Jerome writing with eyeglasses or a reader with a book faced away from the firelight.) In a nutshell, all cannot be trusted in a painting!

Figures

Figure 1. Forms and Surfaces of Literacy Technologies. PowerPoint slide. Collage from stone tablets to computers complied by Sarah Dowhower. Keynote Presentation, American Reading Forum, December 10, 2010.

Figure 2. Writing Tools and Accessories. PowerPoint slide. Collage of composing instruments and supplemental devices complied by Sarah Dowhower. Keynote Presentation, American Reading Forum, December 10, 2010.

Figure 3. Literacy Furniture. PowerPoint slide. Collage of furniture specifically crafted for reading and writing complied by Sarah Dowhower. Keynote Presentation, American Reading Forum, December 10, 2010.

Figure 4. Storage and Protection. PowerPoint slide. Collage of materials that safeguard literacy artifacts complied by Sarah Dowhower. Keynote Presentation, American Reading Forum, December 10, 2010.

Figure 5. Vision Aids (and Accessories). PowerPoint slide. Collage of tools that improve eyesight for reading and writing complied by Sarah Dowhower. Keynote Presentation, American Reading Forum, December 10, 2010.

Figure 6. Illumination. PowerPoint slide. Collage of artificial lighting tools that improve sight complied by Sarah Dowhower. Keynote Presentation, American Reading Forum, December 10, 2010.

Figure 7. Cuneiform clay tablet. C. 2350 BCE. An account of barley rations issued monthly to adults (30 or 40 pints) and children (20 pints) written in year 4 of King Urukagina. From Ngirsu, Iraq. London, British Museum. BM 102081. Photo retrieved from http://en.wikipedia.org/wiki/File:Issue of barley rations.JPG

Figure 8. Tefillin (Phylactery): Qumran XQ Phyl 2. 1st century CE. 4.3 x 2.7 cm. Imaged reproduced by Gary D. Martin (2006) from *Tefillin from Qumran* by Yigael Yadin, (*XQ Phyl 1-4*), Plate XV. Retrieved from <u>http://aoal.org/bt/tefillin.html</u>

Figure 9. A Roman glass globe from Bonn Museum, Germany. Robert Temple holds the water-filled ball over letters to show how they can be enlarged. Photo used with permission of Robert Temple. From *The Crystal Sun* by Temple (2000), Plate 50 with description on pp. 404-405.

Figure 10. Oldest surviving mirror. 6000-5900 BCE. Photograph of a young woman viewing herself in a mirror manufactured at Catal Höyük, Turkey. Enoch (2009), Figure 3. Photo with permission of author and retrieved from

Figure 11. Roman waxed tablet replica. n.d. Photo retrieved from http://historicconnections.webs.com/historyofwriting.htm

Figure 12. Modern hand mirror. 2011. Photographer, Sarah Dowhower.

Figure 13. Modern magnifying mirror. 2011. Photographer, Sarah Dowhower.

Figure 14. Attributed to Python. *Aphrodite* detail. 350-340 BCE. Paestan Red Figure Greek Vase, Louvre N3157. Paris, Musée de Louvre. By the mirror's reflection above, Aphrodite is watching from heaven as her son-in-law Kadmos confronts the Drakon (Ismenian dragon) in the sky. If the mirror was concave, the scene would be enlarged. Image used with permission of Aaron Atsma, Curator of the Theoi Project. Retrieved from http://www.theoi.com/Gallery/K10.16.html

Figure 15. Tommaso (Tomaso) da Modena. *Chapter House with Forty Dominican Dignitaries.* 1352. Fresco, average height of 150 cm. Treviso, Italy, Chapter House of the Dominican Monastery of the Church of San Nicoló. Photo used with permission of Dominican History Blog, Brothers of the Province of St. Joseph. Paintings of famous Dominican clerics in history: two popes, 18 cardinals, 17 Dominican friars and 3 faintly seen saints (Dominic, Peter Martyr and Aquinas) hard at work at their desks in scholarly pursuits. View a video of the cycle on four walls and photo from the Dominican History website: <u>http://dominicanhistory.blogspot.com/2011/05/forty-dominicans-at-their-desks.html</u>

For individual pictures of all the Dominicans in their cells see the *Cycle of the Dominicans* from the Dominican History website:

http://www.lionstrevisoduse.org/tomaso/eng/html/opere/capitolo/altri.htm

Figure 16. Tommaso (Tomaso) da Modena. *Portrait of Pietro Isnardo da Chiampo of Vicenza* with magnifying mirror. 1352. Fresco. Treviso, Italy, Chapter House of the Dominican Monastery of the Church of San Nicoló. Image used with permission of Dr. David A. Fleishman, Curator of Antique Spectacles and Other Vision Aids Online Museum. Retrieved from

http://www.antiquespectacles.com/slide shows/non vision aids/nva.htm

Figure 17. Master of the White Inscriptions. *Vincent de Beauvais, Author Portrait* detail and detail of an enlarging mirror. Late 15th century. Illuminated manuscript in *Speculum Historiale*, Royal 14 E I, fol. 3, London, British Library. A Dominican monk, sitting at a desk and writing, frontispiece of Book 1. Courtesy of © British Library Board. Retrieved from

http://www.bl.uk/catalogues/illuminatedmanuscripts/ILLUMIN.ASP?Size=mid&IIIID=4 3440

Figure 18. Tommaso (Tomaso) da Modena. *Jerome in his Study* with detail of hornedshaped mirror. 1352. Column fresco, 210 x 515 cm. Treviso, Italy, Nave of the Church of San Nicoló. Photographer, Gali-Dana Singer and used with permission. Retrieved from http://www.flickr.com/photos/crivelli/4184925154/

Figure 19. Niccolo Colantonio. *Jerome in his Study* and detail of horned-shaped mirror. 1445. Oil on wood, 125 x 151 cm. Naples, Museo di Capodimonte. Retrieved from http://en.wikipedia.org/wiki/File:Colantonio.jpg

Figure 20. Giovanni Battista Palatino. *Instruments of Writing* and detail of a horned-shaped writing mirror. 1540/1545/1566. Woodcut, 206 x 145 mm. *Libro nuovo*

d'imparare a scrivere (New Book for Learning to Write). Rome: Camp di Fiore. Retrieved from the Internet Archive, Open Library website (p. 116/134): http://www.archive.org/stream/librodimgiovamba00pala#page/n0/mode/2up

Figure 21. Reading stone. n.d. Plano-convex lens. Oberkochen, Germany, Zeiss Optical Museum. Image used with permission of Dr. David A. Fleishman, Curator of Antique Spectacles and Other Vision Aids Online Museum. Retrieved from http://www.antiquespectacles.com/history/reading_stone.htm

Figure 22. Modern dome magno-illuminator. 2011. Acrylic with magnification power of 4X (12 diopters). Photographer, Sarah Dowhower.

Figure 23. Sloane Lens (60869-A). n.d. Quartz. Biconvex oval lens ranging from 6.5-8.5 diopters and magnification of 2 ½-3X. London, Natural History Museum, Sir Hans Sloane Collection. Photo by Robert Temple and used with permission. From *The Crystal Sun* by Temple (2000), Plate 53 with description on p. 405.

Figure 24. Ludwig Konraiter. *St. Anna, Madonna with Babe and 10 Virgin Saints* from *Life of St. Mary and St. Ursula Altarpiece* and detail of St. Ottilia with reading stones. 1485–1490. Oil on panel. Innsbruck, Austria, Museum of Wilten Monastery (Tyrol). Scanned from C. Frugoni (2003) *Figure 17*, p. 24. Detail retrieved from http://www.optiker.at/archiv/galerie/wilten/wilten.htm

Figure 25. Lucos Cranach the Elder. *Saints Christina and Ottilia* detail. 1506. St. Catherine Altarpiece: Reverse of Shutters. Oil on linden, 123 x 67 cm. London, National Gallery. Retrieved from

http://commons.wikimedia.org/wiki/File:Lucas_Cranach_the_Elder_-Saints_Christina_and_Ottilia_-_Google_Art_Project.jpg

Figure 26. Table Reliquary and detail of #4 window. 1220-1225. Wood and rock crystal, 405 x 450 mm; diameter 64 mm of #4. Treasure Room in the Cathedral of Halberstadt, Germany. Image courtesy of Domschatzverwaltung Halberstadt, owner, at <u>http://www.dom-und-domschatz.de</u>

Also see <u>http://www.transromanica.com/en/poi/?artikel=127</u> (Click on "History" for image.)

Figure 27. Mauritius Rotunda or Chapel of the Holy Sepulcher. C. 1250-1260. Sculpture of painted sandstone, diameter 2.43 m, height 4.65 m. Chapel in the Cathedral of Constance (Konstanz), Germany. Photo retrieved from http://commons.wikimedia.org/wiki/File:Konstanz_Muenster_Heiliggrab.jpg?uselang=de

Figure 28. Greek Hippocrates as a pharmacist. C. 1250-1260. Sculpture of painted sandstone. Interior of the Gothic Holy Sepulcher, Mauritius Rotunda, Chapel in the Cathedral of Constance (Konstanz), Germany. Image used with permission of Dr. David A. Fleishman, Curator of Antique Spectacles and Other Vision Aids Online Museum. Retrieved from http://www.antiquespectacles.com/slide_shows/non_vision_aids/nva.htm

Figure 29. Tommaso (Tomaso) da Modena. *Portrait of Cardinal Nicolas of Rouen* and detail of single reading lens. 1352. Fresco. Treviso, Italy, Chapter House of the Dominican Monastery of the Church of San Nicoló. Image by permission of Dr. Emil Krén, Editor of Web Gallery of Art. Retrieved from <u>http://www.wga.hu/frames-e.html?/html/t/tommaso/index.html</u>

Figure 30. Andrea de' Bartoli. *Philosophers confronting St. Catherine* detail of singular lens use. 1367-69. Fresco. Assisi, Italy, Chapel of St. Catherine of Alexandria, Lower Church of St. Francis and burial chapel of Franciscan Cardinal Albornoz (d. 1367). Image used with permission from Dr. David A. Fleishman, Curator of Antique Spectacles and Other Vision Aids Online Museum. Retrieved from http://www.antiquespectacles.com/rivet_spectacles/paintings/paintings.htm

Figure 31. Raphael. *Pope Leo X with Two Cardinals* and detail of single concave lens. 1517-1518. Oil on wood, 154 x 119 cm. Florence, Galleria degli Uffizi. Image used by permission of Dr. Emil Krén, Editor of Web Gallery of Art. Retrieved from http://www.wga.hu/frames-e.html?/html/r/raphael/5roma/5/09leo x.html

Figure 32. Jacope Chimenti (called Jacope da Empoli). *Michelangelo Presents His Model of San Lorenzo to Leo X, 1617-19.* Paint on wood, 2.36 x 1.41 m. Florence, Casa Buonarotti. Image used with permission of kleio.org website and retrieved from http://www.kleio.org/en/history/famtree/medici/663.html

Figure 33. Examples of long and short handled quizzing glasses. Left: c. 1820. Gold octagonal magnifying lens, 4 ¹/₄ in. long. Right: c. 1830. Tiny rectangular sterling silver with swivel hand, 1³/₄ in. long. In Hern (2004), Figure 5. Image used with permission from Candice Hern. Retrieved from http://www.candicehern.com/collections/04/eyeglass.htm

Figure 34. I. Robert and George Cruikshank. *Tom and Jerry Taking the Hint.* 1830. Oil on canvas. Private Collection. Appeared in Pierce Eagan's *Life in London*, 1830. Retrieved from http://www.wikigallery.org/wiki/painting_229042/I.-Robert-and-George-Cruikshank/Tom-and-Jerry-taking-the-hint-at-Logics-being-blown-up-at-Point-Nonplus

Figure 35. French School. *Theodore Rousseau.* 1850. Engraving. Private Collection. Retrieved from <u>http://www.wikipaintings.org/en/theodore-rousseau</u>

Figure 36. Richard Evans. *Olinthus Gilbert Gregory.* 1835. Lithograph engraved by H. Robinson. Private collection. Retrieved from http://en.wikipedia.org/wiki/File:Olinthus_Gregory.jpg

Figure 37. Antoine Charles Horace Vernet (after). *A Lady in a Levantine Hat.* 1797. Aquatint engraving from *Incroyable et merveilleuse, #*6 plate of a series of fashion plates engraved by Georges Jacques Gatine (1773-1831). Image courtesy of Mark Harden, Artchive Web Gallery. Retrieved from <u>http://www.artchive.com/web_gallery/C/Carle-</u> Vernet/A-Lady-in-a-Levantine-hat,-a-tiered-skirt-and-a-velvet-jacket,-plate-6-from-the-Incroyable-et-merveilleuse-series-of-fashion-plates,-engraved-by-Georges-Jacques-Gatine-1773-1831-published-1797-in-Paris.html

Figure 38. Jean Auguste Dominique Ingres. *Madame Marie Marcotte (Marcotte de Sainte-Marie)* and detail of quizzer. 1826. Oil on canvas, 93 x 74 cm. Paris, Musée du Louvre. Retrieved from

http://commons.wikimedia.org/wiki/File:Ingres_Madame_Marie_Marcotte.jpg

Figure 39. Pietro Longhi. *The Geography Lesson.* Before 1785. Oil on canvas. Venice, Italy, Galleria Querini-Stampalia. Retrieved from http://www.wikipaintings.org/en/pietro-longhi/the-geography-lesson

Figure 40. French cap monocle suspended from a forehead band with Ayscough doublehinged side temples. Late 18th C. Tortoiseshell. Image used with permission of Dr. David A. Fleishman, Curator of Antique Spectacles and Other Vision Aids Online Museum. Retrieved from http://www.antiquespectacles.com/slide_shows/tortoiseshell/others/others.htm

Figure 41. Anna Dorothea Therbusch. *Self Portrait* detail of a spina-frontalis-monocle. C. 1780. Oil on canvas. Linz, Austria, Schlossmusuem. Image used with permission of Dr. David A. Fleishman, Curator of Antique Spectacles and Other Vision Aids Online Museum. Retrieved from <u>http://www.antiquespectacles.com/people/people.htm</u>

Figure 42. Anna Dorothea Therbusch. *Self Portrait with Monocle.* 1777. Oil on canvas, 153.5 x 118 cm. Berlin, Gemaldegalerie Staaliche. Retrieved from http://commons.wikimedia.org/wiki/File:Anna_Dorothea_Therbusch_001.jpg

Figure 43. Claude Monet. *Young Man with a Monocle* detail. 1857. Pastel and watercolor on paper, 240 x 160 mm. Paris, Musée Marmottan. Retrieved from http://www.artfinder.com/work/young-man-with-a-monocle-claude-monet/

Figure 44. Walter Greaves. *Portrait of James Abbott McNeill Whistler (1834-1903).* 1871. Oil on canvas, 63.5 x 76.2 cm. Private Collection. Image courtesy of the Art Renewal Center, Fred Ross, Chairman. Retrieved from http://www.artrenewal.org/pages/artwork.php?artworkid=10414

Figure 45. John Singer Sargent. *The Right Honourable Joseph Chamberlain.* 1896. Oil on canvas, 1619 x 914 mm. London, National Portrait Gallery. Retrieved from http://en.wikipedia.org/wiki/File:Joseph_Chamberlain_John_Singer_Sargent_1896.jpeg

Figure 46. James Spedding (attributed to). *Alfred Tennyson, 1st Baron Tennyson (1809-1892). C.* 1831. Pencil drawing, 197 x 140 mm. London, National Portrait Gallery, NPG 3940. Image used with permission. Retrieved from http://www.npg.org.uk/collections/search/portrait/mw06247/Alfred-Tennyson-1st-Baron-Tennyson?LinkID=mp04454&role=sit&rNo=0

Figure 47. Elliott & Fry. Alfred Tennyson, 1st Baron Tennyson. Late 1896s. Carbon print on card mount, 189 x 121 mm. London, National Portrait Gallery, NPGx126801. Image used with permission. Retrieved from http://www.npg.org.uk/collections/search/portrait/mw82252/Alfred-Tennyson-1st-Baron-Tennyson?LinkID=mp04454&search=sas&sText=alfred+tennyson&wPage=1&role=sit& rNo=39

Figure 48. John Mayall. A Portrait of Karl Marx. 1875. Tinted photograph. Amsterdam, Netherlands, International Institute of Social History. One of four photos taken in rapid sequence by Mayall. 1200 prints were sent to socialists worldwide. Used with permission. Retrieved from http://www.ijsg.nl/collections/marx/a9-369.php

Figure 49. George Grosz. The Pillars of Society with Nazi and Monocle detail. 1926. Oil on canvas, 200 x 108 cm. Berlin, Germany, Staatliche Museen-Preussischer Kulturbesitz, Nationalgalerie. Retrieved from http://www.abcgallery.com/G/grosz/grosz26.html

Figure 50. Herbert Morton Stoops. They'll Give You a Fresh Start in Life. 1941. Oil on canvas. The Philadelphia History Museum, Historical Society of Pennsylvania Collection. Part of a series of award winning wartime advertisements given to the HSP by The American Locomotive Company (Alco). See Atwater Kent Museum Cover of Life, January 4, 1943. Retrieved from http://books.google.com/books?id=n04EAAAAMBAJ&pg=PA32&lpg=PA32&dq=%22t hey%27ll+give+you+a+fresh+start%22&source=bl&ots=sBhu03LgeP&sig=hJ5qVvr6m 0qvHim121OqCx fXSg&hl=en&ei=MSPdTebGK6by0gHi4Oz5Dw&sa=X&oi=book re sult&ct=result&resnum=2&ved=0CB0Q6AEwAQ#v=onepage&q=%22they%2711%20gi ve%20you%20a%20fresh%20start%22&f=false

Figure 51. Edgar Degas. At the Café Châteaudun. 1869-1871. Pencil and oil on paper, mounted on canvas, 23.7 x 19 cm. London, National Gallery, NG6536. Image used with permission. Retrieved from http://www.nationalgallery.org.uk/paintings/hilaire-germainedgar-degas-at-the-cafe-chateaudun

Figure 52. Francois Xavier Fabre. Portrait of Abbot Thomas Valperga of Caluso and detail of a portable magnifier. 1802. Oil on canvas. Torino, Italy, Muse Civico d'Arte Image used with permission of Dr. David A. Fleishman, Curator of Antique Spectacles and Other Vision Aids Online Museum. Retrieved from http://www.antiquespectacles.com/slide shows/previous/previous 2.htm

Figure 53. Charles Spencelayh. Fingerprints. 1953. Oil on canvas, 43 x 53 cm. Bournemouth, UK, Russell-Cotes Art Gallery and Museum. See at Russell-Cotes Art Gallery and Museum Shop website:

http://www.russellcotesartshop.co.uk/artist/7283/Charles Spencelayh

Figure 54. R. Klausner. *Close Scrutiny.* 19th century. Oil on panel, 37.5 x 26.5 cm. Private Collection. Retrieved from <u>http://www.wikigallery.org/wiki/painting_203651/R.-Klausner/Close-Scrutiny</u>

Figure 55. Norbet Goeneutte. *Dr. Paul Gachet.* 1891. Oil on panel, 35 x 26.7 cm. Paris, Musee d'Orsay. Retrieved from <u>http://commons.wikimedia.org/wiki/File:Norbert_G%C5%93neutte_-</u> Le Docteur Paul Gachet.jpg

Figure 56. Norman Rockwell. *Book of Romance.* 1927. Oil on canvas, 32 x 48 in. Stockbridge, MA, Norman Rockwell Museum. See at the Norman Rockwell Museum website:

http://collection.nrm.org/search.do?id=229832&db=object&view=full

Figure 57. Nuns' choir at Wienhausen Abbey, Germany. 1301. Photo retrieved from <u>http://www.viatoura.de/kloster-wienhausen/fotogalerie/1.html</u> For more pictures and information also see Kloster Wienhausen website: <u>http://www.kloster-wienhausen.de/</u>

Figure 58. Three types of rivet spectacles, type 1, type 2 and type 3. 1330. Earliest surviving rivet spectacles found at Wienhausen Abbey, Germany in 1953. Photos used with permission of Dr. David A. Fleishman, Curator of Antique Spectacles and Other Vision Aids Online Museum. Retrieved from http://www.antiquespectacles.com/topics/wienhausen/3/spectacles.htm

Figure 59. Salisbury nun wearing rivet type 1 spectacles and detail. 1330/1430-1440. Corbel on the north aisle of the Parish Church of Sarum St. Martin, Salisbury, UK. London, The College of Optometrists/British Optical Association Museum. Images used with permission of Neil Handley, Curator BOA Online Museum. Retrieved from <u>http://www.college-optometrists.org/en/knowledge-</u> centre/museyeum/online_exhibitions/spectacles/rivet.cfm

Figure 60. Westphalian Master. *The Relatives of St. Anne (Holy Kinship)* detail of Zebedee reading with rivet type 1 spectacles. C. 1470. Panel painting, 69 x 144 cm. Maastricht, Netherlands, Basilica of St. Servatus, Cathedral Treasury. Also called *The Blood-Relationship (Consanguinity) of St. Anna.* Zebedee is St. Anne's third daughter, Mary Salome's husband. Their children were St. James the Greater and St. John the Evangelist. Image used with permission from Hans Meijer, Foundation Musick's Monument. Retrieved from

http://web.mac.com/musicksmonumentdownl/Holy_Kinship_Maastricht/Holy_Kinship_. html

Figure 61. Konrad von Soest. *Glasses Apostle (St. Luke?).* 1403. Wildungen Altar. Tempera on wood, 188 x 152 cm. Germany, Church of Bad Wildungen. One of the oldest depictions of eyeglasses north of the Alps. Retrieved from http://commons.wikimedia.org/wiki/File:Conrad_von_Soest, %27Brillenapostel%27 (14 03).jpg

Figure 62. Tommaso (Tomaso) da Modena. *Cardinal Hugh de Saint Cher* and detail of rivet reading glasses. 1352. Fresco. Treviso, Italy, Chapter House of the Dominican Monastery of the Church of San Nicoló. Earliest known representation of spectacles in a painted work of art. Retrieved from

http://commons.wikimedia.org/wiki/File:Tommaso_da_modena,_ritratti_di_somenicani_ (Ugo_di_Provenza)_1352_150cm, treviso,_ex_convento_di_san_niccolò,_sala_del_capit_ olo.jpg_t_spectacles/paintings/paintings.htm

Figure 63. Dr. Vincent Ilardi (1925-2009), Emeritus Professor of History, University of Massachusetts wearing replica of rivet type 1 spectacles. Photo used with permission of Dr. David A. Fleishman, Curator of Antique Spectacles and Other Vision Aids Online Museum. Retrieved from

http://www.antiquespectacles.com/topics/ilardi/images/ilardi images.htm

Figure 64. Monk in a choir with tong spectacles, a prototype of scissor spectacles. 14th century. Choir book illuminated manuscript. Florence, Convento di San Marco. Image used with permission of Dr. David A. Fleishman, Curator of Antique Spectacles and Other Vision Aids Online Museum. Retrieved from http://www.antiquespectacles.com/rivet_spectacles/representations/representations.htm

Figure 65. Antiphonarium and detail of singer with spectacles. 15th century. Illuminated manuscript. Florence, Biblioteca Medicea Laurenziana, MS. Edili 146, fol. 62. Images used with permission of Dr. David A. Fleishman, Curator of Antique Spectacles and Other Vision Aids Online Museum. Retrieved from http://www.antiquespectacles.com/topics/ilardi/images/ilardi_images.htm

Figure 66. Andrea de' Bartoli. *Philosophers confronting St. Catherine* detail of single lens and spectacle use. 1367-69. Fresco. Assisi, Italy, Chapel of St. Catherine of Alexandria, Lower Church of St. Francis and burial chapel of Franciscan Cardinal Albornoz (d. 1367). Image used with permission of Dr. David A. Fleishman, Curator of Antique Spectacles and Other Vision Aids Online Museum. Retrieved from http://www.antiquespectacles.com/rivet_spectacles/paintings/paintings.htm

Figure 67. Circle of Derick Baegert. *Death of Saint Martin of Tours and St. George as Dragon Slayer* detail. C. 1480. Oakwood altarpiece, Nr.383WKV. Munster, Germany, Westfälisches Landesmuseum. Image used with permission of Dr. David A. Fleishman, Curator of Antique Spectacles and Other Vision Aids Online Museum. Retrieved from http://www.antiquespectacles.com/rivet_spectacles/altarpieces.htm

Figure 68. Death of Mary and detail. *C.* 1370-1386. Left inside wing of the Schloss Altarpiece of Tyrol (Tirol) Castle. Tempera on beechwood altarpiece. Innsbruck, Austria, Museum Ferdinandeum. Image with permission of photographer Andra Moclinda and retrieved at <u>http://www.flickr.com/photos/andra_mb/4104582111/</u>

Figure 69. Workshop of Hans and Jakob Strueb. *Death of Mary* detail of Bartholomew and an older Apostle with rivet 1 type spectacles. 1510. Pine panel altarpiece, 73 x 93

cm. Kunzelsau, Germany, Museum Würth Collection. Image used with permission of Dr. David A. Fleishman, Curator of Antique Spectacles and Other Vision Aids Online Museum. http://www.antiquespectacles.com/topics/religion/paintings/paintings.htm

Figure 70. Death of Mary and detail. C. 1418. Altarpiece. Paint on wood panel. Hannover, Germany, Neidersächsisches Landesmuseum. Possibly the earliest representation of tinted spectacles, probably type 1. Images used with permission of Dr. David A. Fleishman, Curator of Antique Spectacles and Other Vision Aids Online Museum. Retrieved from

http://www.antiquespectacles.com/rivet_spectacles/paintings/paintings.htm#

Figure 71. Master of the Altar Albrecht. *Dormition of the Virgin* and detail of apostle with rivet 2 spectacles in shared reading. 11th century/1437-1439. Albrecht Altarpiece. Painted wood. Vienna, Klosterneuberg Monastery. Retrieved from http://upload.wikimedia.org/wikipedia/commons/1/18/Meister_des_Albrechtsaltars_005.jpg

Figure 72. Earliest surviving leather framed spectacles found in Willibald Pirchkheimer's study and detail of a slit bridge. C. 1520-30. Eisenach, Germany, Wartburg Castle. Photographs courtesy of Dr. David Fleishman, Curator of Antique Spectacles and Other Vision Aids Online Museum.

Figure 73. Jan Van Eyck. *The Virgin with the Canon van der Paele* (1370-1443) and detail of leather spectacles. 1436. Oil on wood panel, 141 x 176.5 cm. Bruges, Groeninge Museum. Image by permission of Dr. Emil Krén, Editor of Web Gallery of Art. Retrieved from <u>http://www.wga.hu/index1.html</u> (Search under Eyck and Paele)

Figure 74. Ezra renewing the law. 1465-1470. Illuminated manuscript on vellum. Philadelphia Museum of Art, *Pembroke Hours (Book of Hours for the Sarum Use and Gallican Psalter with Canticles)*, MS 2, fol. 109v. Retrieved from http://www.leavesofgold.org/gallery/psalters/psalter09.html

Figure 75. Ludovico Mazzolino. *The Adulteress before Christ* and detail of leather bow spectacles and eyeglass case. Early 16th century. Oil on panel. Zagreb, Croatia, Croatian Academy of Science and Art, Strossmayer's Old Masters Gallery. Photographer, Sheepdog Rex and used with permission. Retrieved from http://www.grphas.com/photos/sheepdog_rex/5855650657/in/set-72157627011664262/ Detail retrieved from

http://www.flickr.com/photos/sheepdog_rex/5856204848/in/photostream/lightbox/

Figure 76. Jose Van Cleve (after). *Saint Jerome in His Study* and detail of bow spectacles. 16-17th centuries. Oil on canvas, 85 x 63 cm. London, The College of Optometrists/British Optical Association Museum. Images used with permission of Neil Handley, Curator BOA Online Museum. Retrieved from College of Optometrists website at <u>http://www.college-optometrists.org/en/knowledge-</u> centre/museyeum/online_exhibitions/artgallery/memento.cfm *Figure* 77. Georges de la Tour. *Saint Jerome Reading*. 1621-23. Oil on canvas on wood, 63.3 x 55 cm. London, Royal Collection, Hampton Court. Retrieved from http://commons.wikimedia.org/wiki/File:LA_TOUR, Georges_de_-_Saint_Jerome_Reading_(1621-23).jpg

Figure 78. Georges de La Tour. *Saint Jerome Reading.* 1652. Oil on canvas, 122 x 93 cm. Paris, Musée du Louvre. Photographer, Ondra Havala and used with permission. Retrieved from <u>http://www.flickr.com/photos/havala/4081065416/</u>

Figure 79. William van Drielenburg. *Jerome Reading* and detail of Nuremberg wire spectacles. 1677. Oil on canvas, 115 x 118 cm. Palermo, Italy, Private Collection. Retrieved from <u>http://www.anticoantico.com/categoria_dettaglio.asp?articolo=48707</u>

Figure 80. Jan Lievens. *Old Woman Reading.* 1621-23. Oil on panel, 71.4 x 67.3 cm. Philadelphia Museum of Art. Retrieved from http://www.philamuseum.org/collections/permanent/102271.html?mulR=30755|14

Figure 81. Rembrandt (and/or Jan Lievens). *Portrait of Rembrandt's Mother.* 1629. Oil on canvas, 76 x 64 cm. Salisbury, UK, Collection of the Earl of Pembroke, Wilton House. Image courtesy of photographer, Sibi. Retrieved from <u>http://www.flickr.com/photos/beebee/3781490802/</u> Also see at http://www.antiquevaluers.co.uk/old_harlequins/articles/wilton2.html

Figure 82. Antonio Pisanello. Three men, one with cap rivet spectacles (from the records of the Council of Constance). First half of the 15^{th} century. Drawing of brown ink wash, 0.190 x 0.203 m. Paris, Musée du Louvre. Image used with permission of \mathbb{C} Musée du Louvre. Retrieved from http://arts-

graphiques.louvre.fr/fo/visite?srv=mipe¶mAction=actionGetImage&idImgPrinc=1& idFicheOeuvre=3465&provenance=mlo&searchInit=

Figure 83. B. Caraviello. *Bishop Alfonso of Liquori.* 1768. Paint on burlap. Pagani, Italy, Museum Alfonsiano di Pagani. Image used with permission of Dr. David A. Fleishman, Curator of Antique Spectacles and Other Vision Aids Online Museum. Retrieved from <u>http://www.antiquespectacles.com/slide_shows/previous/previous_2.htm</u>

Figure 84. El Greco. *The Portrait of a Cardinal* detail. C. 1600. Oil on canvas, 170.8 x 108 cm. New York, Metropolitan Museum of Art. Image by permission of Dr. Emil Krén, Editor of Web Gallery of Art. Retrieved from <u>http://www.wga.hu/frames-e.html?/html/g/greco_el/1596-600/13cardin.html</u>

Figure 85. Émile Zola (1840-1902). 1902. Photo. Retrieved from http://en.wikipedia.org/wiki/File:ZOLA_1902B.jpg

Figure 86. Edouard Manet. *Portrait of Émile Zola* and detail of pince-nez. 1868. Oil on canvas, 146 x 114 cm. Paris, Musee d'Orsay. Retrieved from http://en.wikipedia.org/wiki/File:Manet, Edouard - Portrait of Emile Zola.jpg

Figure 87. Marcellin Gilbert Desboutin. *Edgar Degas.* Before 1900. Oil on burlap, 46 x 31 cm. Versailles, France, Musée National du Château et des Trianons. Retrieved from <u>http://commons.wikimedia.org/wiki/File:Marcellin_Desboutin_-</u> Portrait_Edgar_Degas.jpg

Figure 88. Karl Johann Becker-Gundahl. *Theodore Roosevelt.* 1925. Oil on panel, 34.3 x 22.9 cm. San Marino, CA, The Huntington Library, Art Collections, and Botanical Gardens. Photo courtesy of the Huntington Art Collections, San Marino, California. Retrieved from <u>http://emuseum.huntington.org/view/objects/asitem/212/211/title-asc?t:state:flow=2fd7e419-5223-49af-bf64-b19e656fb95e</u>

Figure 89. Scarlett temples with swirls. C. 1728-1730. Brass frames. Germany, Kassel Museum. Photo used with permission of Dr. David A. Fleishman, Curator of Antique Spectacles and Other Vision Aids Online Museum. Retrieved from http://www.antiquespectacles.com/slide_shows/temple_spectacles.htm

Figure 90. Scarlett temples with rings. C. 1780. Iron framed. Washington, DC, Museum of Science and Industry. Photo used with permission of Dr. David A. Fleishman, Curator of Antique Spectacles and Other Vision Aids Online Museum. Retrieved from

http://www.antiquespectacles.com/slide shows/temple spectacles/temple spectacles.htm

Figure 91. Straight-arm temples. C. 1800. Brass round framed with C-bridge and small finials. From the original Hugh Orr Collection. Photo used with permission of Dr. David A. Fleishman, Curator of Antique Spectacles and Other Vision Aids Online Museum. Retrieved from <u>http://www.antiquespectacles.com/trade_cards/associated/associated.htm</u>

Figure 92. Anton Graff. *Portrait of Daniel Nikolaus Chodowiecki.* 1800-1801. Oil on canvas. Berlin, Staatliche Museum. Retrieved from http://commons.wikimedia.org/wiki/File:Graff Portrait Daniel Chodowiecki.jpg

Figure 93. Jean-Baptiste Chardin. *Self-Portrait with glasses.* 1771. Pastel, 46 x 38 cm. Paris, Musée du Louvre. Image by permission of Dr. Emil Krén, Editor of Web Gallery of Art. Retrieved from <u>http://www.wga.hu/frames-e.html?/html/c/chardin/index.html</u>

Figure 94. Jean-Baptiste Chardin. *Self-Portrait with eyeshade.* 1775. Pastel on blue paper, 46 x 38 cm. Oil on canvas, Paris, Musée du Louvre. Image by permission of Dr. Emil Krén, Editor of Web Gallery of Art. Retrieved from <u>http://www.wga.hu/frames-e.html?/html/c/chardin/index.html</u>

Figure 95. Double-hinged spectacles. C. 1760-80. Steel framed. Photograph courtesy of Dr. David Fleishman, Antique Spectacle and Other Visions Aids Online Museum.

Figure 96. Turn-pin temples. C. 1800. English silver framed. Hallmarked Pons (the maker.) Photograph courtesy of Dr. David Fleishman, Antique Spectacle and Other Visions Aids Online Museum.

Figure 97. Sliding pin-in-slot adjustable temples with small circle finials. 1805. Silver framed. Hallmarked English. Photograph courtesy of Dr. David Fleishman, Antique Spectacle and Other Visions Aids Online Museum. These temple spectacles are owned by Dr. Fleishman and are considered to be the oldest sliding sides with a date mark. They were originally in the Hugh Orr Collection.

Figure 98. Joshua Reynolds (as copied by a student). *Self Portrait* and detail of wig turn-pin spectacles. 1788. Oil on canvas, 75.2 x 63.2 cm. London, Royal Collection. Retrieved from <u>http://www.wikigallery.org/wiki/painting_361822/%28after%29-Sir-Joshua-Reynolds/Self-Portrait</u>

Figure 99. Turn-pin spectacles owned by Sir Joshua Reynolds. Before 1792. Silver with round lens frame, double-hinged with medium tear-shaped finials. Private Collection. Photo used with permission of Dr. David A. Fleishman, Curator of Antique Spectacles and Other Vision Aids Online Museum. Retrieved from http://www.antiquespectacles.com/people/people_earlier2.htm

Figure 100. Patrick Henry's surviving double-hinged temples. Before 1799. Richmond, VA, Virginia Historical Society. Photo used with permission of Dr. David A. Fleishman, Curator of Antique Spectacles and Other Vision Aids Online Museum. Retrieved from http://www.antiquespectacles.com/people/people_earlier2.htm

Figure 101. Thomas Sully. *Patrick Henry.* 1851. Oil on canvas, 30 x 25 in. Richmond, VA, Virginia Historical Society. The artist first painted this image in 1815 from a miniature painting taken from life in 1795 by the artist's older brother Lawrence. Image used with permission. Retrieved from <u>http://www.vahistorical.org/sva2003/henry.htm</u>

Figure 102. Martin's Margins. C. 1780s. Steel, clear round lens, C-bridge, doublehinged temples with large teardrop ends. Photo used with permission and retrieved from the American Optometric Association website: <u>http://www.aoa.org/x10953.xml</u>

Figure 103. Benjamin Martin (1758). An Essay on Visual Glasses (Vulgarly called SPECTACLES) Wherein it is shewn, From the Principles of OPTICS, and the Nature of the EYE, that the Common Structure of those Glasses is contrary to the Rules of Art, to the Nature of Things, & c. and very prejudicial to the EYES, 4th edition. London, The College of Optometrists/British Optical Association Museum. Image used with permission of Neil Handley, Curator BOA Online Museum. Retrieved from http://www.college-optometrists.org/en/knowledge-centre/museyeum/online_exhibitions/artgallery/antiques.cfm

Figure 104. Admiral Peter Rainier. 1778-1787. Oil on canvas, 76.5 x 63.8 cm. Boston, Museum of Fine Arts. Retrieved from <u>http://www.mfa.org/collections/object/admiral-peter-rainier-31255</u>

Figure 105. Addison Smith four lens spectacles first patented in 1783. Unknown owner. Photo used with permission of Dr. David A. Fleishman, Curator of Antique Spectacles and Other Vision Aids Online Museum. Retrieved at http://www.antiquespectacles.com/slide shows/4 lens/4 lens.htm

Figure 106. John Richardson-type four lens spectacles first patented in 1797 adjustable sides and teardrop finials. n.d. Storrs, New York State Museum. Photo used with permission of Dr. David A. Fleishman, Curator of Antique Spectacles and Other Vision Aids Online Museum. Retrieved at

http://www.antiquespectacles.com/slide_shows/4_lens/4_lens.htm

Figure 107. Philip Hewins. *Portrait of Andrew Jackson* detail of four lens spectacles. 1833. Oil on canvas, 69.5 x 56.5 cm. Hartford, Connecticut Historical Society Museum and Library. Retrieved from

http://emuseum.chs.org:8080/emuseum/media/view/Objects/4276/3666?t:state:flow=845 a0631-eaf8-4f9c-8f07-56673a733f93

Figure 108. Benjamin Franklin. Franklin's design for bifocals. May 23, 1785. Washington, DC, Library of Congress. Image of original drawing in his letter retrieved from http://explorepahistory.com/displayimage.php?imgId=5697

Figure 109. Temple spectacles style worn by Benjamin Franklin before bifocals. Second half of 18th century. Steel C-bridge with round frames, temple sides with large circular finials. Photo used with permission of Dr. David A. Fleishman, Curator of Antique Spectacles and Other Vision Aids Online Museum. Retrieved from http://www.antiquespectacles.com/topics/franklin/spectacles/spectacles.htm

Figure 110. David Martin. *Benjamin Franklin.* 1767. Oil on canvas, 127.2 x 101.4 cm. Washington, DC, White House Collection. Retrieved at http://en.wikipedia.org/wiki/File:Benjamin Franklin 1767.jpg

Figure 111. John Trumbull. *Benjamin Franklin.* 1778. Oil on wood, oval 5 ½ x 4 3/8 in. New Haven, CT, Yale University Art Gallery. Retrieved from http://commons.wikimedia.org/wiki/File:Benjamin_Franklin_by_John_Trumbull_1778.jp

Figure 112. Charles Willson Peal. *Benjamin Franklin* (in split-lens bifocals). 1785. Oil on canvas, 23 x 18 ¼ in. Philadelphia, Pennsylvania Academy of the Fine Arts. Retrieved from <u>http://commons.wikimedia.org/wiki/File:Peale - Benjamin Franklin.jpg</u>

Figure 113. Detail from Jefferson's letter to John McAllister showing a sketch of design for spectacles. December 1, 1806. Retrieved from The Jefferson's Monticello website,

Eyeglasses, *Thomas Jefferson Encyclopedia*, Charlottesville, VA: http://wiki.monticello.org/mediawiki/index.php/Image:Spectacles-sketch.jpg

Figure 114. Detail of Abraham Lincoln's two pair of spectacles with cases. 1865. Contents of Abraham Lincoln's pockets on the night of his assassination on exhibit at the Abraham Lincoln Bicentennial Exhibit, 2009. Washington, DC, Library of Congress, Thomas Jefferson Building. Retrieved from: http://www.loc.gov/pictures/item/2011646850/

Figure 115. Franklin C. Courter. *Abraham Lincoln with His Son, Tad.* C. 1929. Oil on hardboard, 116.8 x 90.2 cm. Washington, DC, National Gallery of Art. Image used with permission. Retrieved from <u>http://www.nga.gov/fcgi-bin/tinfo_f?object=42915</u>

Figure 116. Philipp Galle after Johannes Stradanus. *Conspicilla* (Latin for eyeglass) in *Nova Reperta* (New Discoveries). C. 1580/1600. Engraving. London, The College of Optometrists/British Optical Association Museum. Image used with permission of Neil Handley, Curator BOA Online Museum. Retrieved from

http://www.museyeum.org/detail.php?type=related&kv=466&t=objects&PHPSESSID=7 5dacdb94d3ed48a1b0abd82b9a84f9e

or see http://www.vlaamsekunstcollectie.be/nl/uitvinding_van_de_bril.aspx

Figure 117. Frederick D. Hardy. *Try This Pair.* 1864. Oil on canvas, 28 x 41 cm. London, Guildhall Art Gallery. Retrieved from: http://www.wikigallery.org/wiki/painting 210958/Frederick-Daniel-Hardy/Try-this-pair

Figure 118. Edward Scarlett. Focus Mark of 70. C. 1728. Photo used with permission of Dr. David A. Fleishman, Curator of Antique Spectacles and Other Vision Aids Online Museum. Retrieved from

http://www.antiquespectacles.com/trade_cards/associated/associated.htm

Figure 119. Paul Gauguin/Ky Dong. *Self-Portrait.* 1902-1903. Oil on canvas, 42 x 25 cm. Basel, Switzerland, Kunstmuseum. Retrieved from http://en.wikipedia.org/wiki/File:Gauguin_Autoritratto_1902.jpg

Figure 120. Claude Monet's tinted ear-fitting cataract spectacles. C. 1923 or later. Paris, Musée Marmottan Monet. Photo used with permission of Dr. David A. Fleishman, Curator of Antique Spectacles and Other Vision Aids Online Museum. Retrieved from http://www.antiquespectacles.com/people/people_present2.htm

Figure 121. Sir Edward Burne-Jones. *Rudyard Kipling.* 1899. Oil on canvas, 153 x 60 cm. New York, Granger Collection. Retrieved from http://en.wikipedia.org/wiki/File:Rudyard_Kipling_by_Sir_Philip_Burne-Jones_1899.jpeg

Figure 122. Jacques-Emile Blanche. *James Joyce.* 1935. Oil on canvas, 1251 x 876 mm. London, National Portrait Gallery NPG 3883. Image used with permission.

Retrieved from <u>http://www.npg.org.uk/collections/search/portrait/mw03533/James-Joyce?LinkID=mp02467&role=sit&rNo=2</u>

Figure 123. James Joyce. Two pages from a *Finnegan's Wake Notebook* at Buffalo, Joyce 3.3. n.d. See at the website of Brepols, publishers of the *Finnegan's Wake Notebooks* at Buffalo, Daniel Ferrer, Geert Lernout & Vincent Deane (Eds.): http://www.brepols.net/publishers/pdf/Joyce.pdf

Figure 124. Hemingway in Kenya. 1953. Photo. Earl Theisen, photographer, *LOOK Magazine* Collection, Library of Congress, Prints & Photographs Division, [Reproduction number e.g., LC-L9-60-8812, frame 8]. Retrieved from http://www.bu.edu/english/graduate/ma-in-english-and-american-literature/

Figure 125. Randy Hofman. *Hemingway.* 1996. Oil on canvas. Ocean City, MD, Artist's Collection. Image used with Randy Hofman's permission. Retrieved from artist's website: <u>http://img408.imageshack.us/i.mg408/1996/hemingway4ke3.jpg</u>

Figure 126. Sir Joshua Reynolds. 1775. *Portrait of Samuel Johnson ("Blinking Sam")*. Oil on canvas, 76 x 63 cm. San Marino, CA. The Huntington Library, Art Collections, and Botanical Gardens. Retrieved from http://commons.wikimedia.org/wiki/File:Samuel Johnson by Joshua Reynolds 2.png

Figure 127. J. Anthony Willis. *Official Portrait of President Dwight D. Eisenhower.* 1962. Oil on canvas. Washington, DC, The White House Collection. Retrieved at http://en.wikipedia.org/wiki/File:Dwight_D._Eisenhower, official Presidential portrait.j pg

Figure 128. Gold clear plastic browline glasses owned by Eisenhower. C. 1960. Photo retrieved from

http://historical.ha.com/common/view_item.php?Sale_No=625&Lot_No=25500

Figure 129. French School, 20th Century. *AMOR Lunettes.* 1957. Color lithograph. Paris, Bibliotheque des Arts Décoratifs. Advertisement for 'Amor' glasses from *Elle*. Retrieved from <u>http://tootsie.skynetblogs.be/archive/2009/11/13/ancienne-reclame-dans-les-magazines.html</u>

Figure 130. Alexis Smith. *Men Seldom Make Passes at Girls Who Wear Glasses.* 1985. Wall painting with two framed mixed media collages, 68.6 x 462.83.8 x 9.5 cm each of 2. San Diego, Museum of Contemporary Art. Photographer Philipp Scholz Rittermann. © Alexis Smith 1985. Image used with permission. Retrieved from http://www.mcasd.org/artworks/men-seldom-make-passes-girls-who-wear-glasses

Figure 131. Andy Warhol. *Julia Warhola.* 1974. Acrylic and silkscreen ink on linen, 101.6 x 101.6 cm. Pittsburgh, PA, The Andy Warhol Museum. Retrieved from http://ifitshipitshere.blogspot.com/2011/05/from-durer-to-dali-famous-artists-paint.html

Figure 132. Alex Katz. *Poet Kenneth Koch.* 1970. Color lithograph of 5 colors on paper, 27 ¹/₂ x 21 ³/₄ in. Waterville, ME, Colby Museum of Art. Retrieved from http://www.colby.edu/academics_cs/museum/search/Obj4360?sid=9445&x=42243

Figure 133. Chuck Close. *Frank.* 1969. Acrylic on canvas, 274.3 x 213.4 x 7.6 cm. Minneapolis Institute of Art. Minneapolis Institute of Arts. © Chuck Close, courtesy of PaceWildenstein, New York. Retrieved from http://www.artsmia.org/viewer/detail.php?v=12&id=1721

Figure 134. Andy Warhol. *Lee Iacocca.* 1985. Acrylic and silkscreen ink on linen, 71.1 x 61 cm. Pittsburgh, PA, The Andy Warhol Foundation for the Visual Arts. See two versions at the Corbis Images website: http://www.corbisimages.com/Search#p=1&q=Lee+Iacocca&ac=1

Figure 135. Alex Katz. *Ada with Sunglasses.* 1989. Oil on masonite. Waterville, ME, Colby Museum of Art. Retrieved from http://www.colby.edu/academics_cs/museum/search/Obj4519?sid=14152&x=353657

Figure 136. James Wyeth. *Andy Warhol* (wearing large clear acetate framed glasses). 1976. Pittsburgh, PA, Andy Warhol Museum. Retrieved from http://www.flickr.com/photos/32357038@N08/3307711445/in/set-72157614237669753

Figure 137. Chuck Close. *Self-Portrait.* 2004-2005. Oil on canvas, 102 x 86 in. Collection Walker Art Center, Minneapolis: Art Center Acquisition Fund, 1969. Image used with permission. Retrieve from

http://visualarts.walkerart.org/detail.wac?id=1528&title=past%20exhibitions&style=imag

Figure 138. Gerard Dou. *Night School.* 1663-65. Oil on panel, 53 x 40.3 cm. Amsterdam Rijksmuseum. Retrieved from <u>http://ca.wikipedia.org/wiki/Fitxer:Dou, Gerard - The Night School hi res -</u> <u>c. 1660.JPG</u>

Figure 139. D. George Thompson after James William Edmund Doyle. *The Literary Club of 1781.* 1851. Stipple and line engraving. London, National Portrait Gallery. Retrieved from http://en.wikipedia.org/wiki/The Club %28Literary Club%29

Figure 140. Salomon Koninck. *A Philosopher.* 1635. Oil on canvas, 17 x 71 cm. Madrid, Museo del Prado. Image by permission of Dr. Emil Krén, Editor of Web Gallery of Art. Retrieved from <u>http://www.wga.hu/frames-</u> e.html?/html/k/koninck/salomon/index.html

Figure 141. Francusco de Goya. *Sketch for the Annunciation.* C. 1785. Oil on canvas, 42 x 26 cm. Boston, Museum of Fine Arts. Courtsey of Chris McCormick, The Athenaeum. Retrieved from <u>http://www.the-athenaeum.org/art/detail.php?ID=30199</u>

Figure 142. Jacopo Robusti Tintoretto. *St. Mary in Egypt* detail. 1582-1587. Oil on canvas. Venice, Scuola Grande di San Rocco. Image by permission of Dr. Emil Krén, Editor of Web Gallery of Art. Retrieved from <u>http://www.wga.hu/index1.html</u> (Search Tintoretto and Mary.)

Figure 143. Quint Buchholz. *The Journey.* 1987. Ink/pen, 23.3 x 21.2 cm. Unknown media. Artist's collection. Image used with permission. Retrieved from http://www.quintbuchholz.de/en/pictures/1983-1990.html

Figure 144. Frank W. Benson. *The Reader.* 1910. Oil on canvas, 64.14 x 76.84 cm. Private collection. Courtsey of Chris McCormick, The Athenaeum. Retrieved from http://www.the-athenaeum.org/art/detail.php?ID=25137

Figure 145. Atanur Dogan. *Old Man Reading a Book.* 2011. Watercolor, 50 x 70 cm. Artist's Collection. Photograph courtesy of artist. See the Dogan demonstrating the actual painting of this work on September 13, 2011, at http://www.facebook.com/media/set/?set=a.266953626658840.65174.148017685219102 & http://www.facebook.com/media/set & http://www.facebook.com/media/set & http://www.facebook.com/media/set & <a h

Figure 146. Scriptorium. Cloister of Battle Abbey as it might have appeared in the late 13th century. 1995. Color drawing. Image courtesy of © English Heritage Photo Library. See

http://www.englishheritageimages.com/english_heritage_images/print/5793333.html Also see the Victoria and Albert Museum website: http://www.vam.ac.uk/content/articles/m/medieval-monasteries/

Figure 147. St. Thomas Aquinas in *Super quarto libro sententiarum.* 1484. Illuminated manuscript. Naples, Bibliotheca Nazionale, MS. VII. B. 4c, fol. 13r. Scanned from Becket, 1998, p. 63.

Figure 148. Rembrandt van Ryn. *Scholar Reading.* 1631. Oil on canvas, 60 x 48 cm. Stockholm, Nationalmuseum. Retrieved from : http://www.wikipaintings.org/en/rembrandt/philosopher-reading-1631

Figure 149. Johannes Vermeer. *Lady Writing a Letter with her Maid.* 1670-1672. Oil on panel, 72.2 x 59.7 cm. Dublin, National Gallery of Ireland. Image by permission of Dr. Emil Krén, Editor of Web Gallery of Art. Retrieved from (1661-1670, Page 4) http://www.wga.hu/frames-e.html?/html/v/vermeer/index.html

Figure 150. John Koch. *Woman Reading a Newspaper.* 1975. Oil on canvas. Unknown owner. Retrieved from Corbis Images website: http://www.corbisimages.com/Search#q=John+Koch&ac=John+Koch&cat=21,20,17&mt =1&cf=1 *Figure 151.* Eastman Johnson. *Boyhood of Lincoln.* 1868. Ann Arbor, University of Michigan Museum of Art. Oil on canvas, 46.42 x 37.32 in. Retrieved from http://www.flickr.com/photos/trialsanderrors/3374732369/

Figure 152. Solomon Alexander Hart. *An Early Reading of Shakespeare.* 1838. Oil on canvas, 90.2 x 69.8 cm. Private Collection. Image courtesy of the Art Renewal Center, Fred Ross, Chairman. Retrieved from http://www.artrenewal.org/pages/artwork.php?artworkid=5340&size=large

Figure 153. Jan Cornelisz Vermeyen. *St. Jerome Meditating.* 1525-1530. Oil on panel, 38 x 47 cm. Paris, Musée du Louvre. Image by permission of Dr. Emil Krén, Editor of Web Gallery of Art. Retrieved from <u>http://www.wga.hu/frames-</u>e.html?/html/v/vermeyen/index.html

Figure 154. Deer fat oil lamp. Magdalenian culture, 17,000 BP (carbon dating). Red sandstone, 8 ³/₄ in long. Found in Lascaux Cave in Montignac, Dordogne, Aquitaine, France. Viewed in Musée National de Préhistoire aux Eyzies-de-Tayac. Retrieved from http://commons.wikimedia.org/wiki/File:Lampe a graisse - Lascaux.png

Figure 155. Impression of cave painting with stone lamps. n.d. Drawing. Scanned from O'Dea, 1958, p. 32.

Figure 156. Michelangelo. 1508-1512. *Erythrean Sibyl #17* detail of torch and saucer lamp. Fresco. Sistine Chapel. Vatican, Rome. Retrieved from http://en.wikipedia.org/wiki/File:Michelangelo Buonarroti 033.jpg

Figure 157. Ancient Greek clay oil lamp 2500 Y/O. C. 400 BCE. Convex top, 3 ". Retrieved from <u>http://www.liveauctioneers.com/item/8762931</u>

Figure 158. Roman open oil lamp with gladiators. n.d. Koln, Germany, Romisch-Germanisches Museum. Retrieved from <u>http://en.wikipedia.org/wiki/File:RGM_120-1.jpg</u>

Figure 159. Roman bronze oil lamp used in upper class households. C. 200-400 CE. Width 5.6 cm, length 10.9 cm, height 4.2 cm. Retrieved from Et Tu Antiquities, Oil Lamps website: <u>http://ettuantiquities.com/oil_lamps_thumbnails_1.htm</u>

Figure 160. Roman double-spouted lamp with Fortuna in the concave discus. Mid-1st century CE. Mouldmade pottery, length 21.3 cm. Retrieved from the Ancient Resource, LLC website:

http://www.trocadero.com/ancientresourcellc/items/1048254/item1048254.html

Figure 161. Pierre-Paul Prud'hon. *Minerve Lights the Way for the Arts and Sciences* with hand-held metal wick channel lamp. Fourth quarter of 18th century to the 1st quarter of the 19th C. Oil on canvas, 14 x 18 cm. Dijon, Musée des Beauz-Arts. Retrieved from http://www.culture.gouv.fr/Wave/image/ /0332/m013704_0008505_p.jpg

Figure 162. Grave digger with hanging spike oil lamp. 3rd-4th century CE. Early Christian Fresco. Rome, Italy, Catacomb of Saints Marcellinus and Peter. Art Resource, ART87054. See at Art Resource website:

http://www.artres.com/C.aspx?VP3=ViewBox&VBID=2UN365VSRUJ&VBIDL=&AT =Image

Figure 163. Claude-Henre Watelet. *Old Philosopher seated, reading a large book* with hanging open lamp. 1786. Engraving, 19.2 x 14.6 cm. Photo courtsey of San Francisco, De Young Fine Arts Museums. Retrieved from <u>http://deyoung.famsf.org/search-collections</u>

Figure 164. Detail of author (Burchard) writing on bifolium with wall niche oil lamp in *Lives of St. Edmund and St. Fremund* by John Lydgate. 1434-1439. Illuminated manuscript. London, British Library, MS. Harley 2278, fol. 74r. Courtesy of © British Library Board. Retrieved from

http://www.bl.uk/catalogues/illuminatedmanuscripts/ILLUMIN.ASP?Size=mid&IllID=1 5579

Figure 165. Charles Louis Müller. *The Study and Inspiration* with Roman lampstand. 1864. Oil on canvas, 92 x 52 cm. Paris, Musée du Louvre. Image used with permission of © Musée du Louvre. Retrieved from

http://www.culture.gouv.fr/Wave/image/joconde/0022/m503604_91de2908-2_p.jpg or

http://cartelfr.louvre.fr/cartelfr/visite?srv=car_not_frame&idNotice=5879&langue=fr

Figure 166. Gerbrand van den Eeckhout. *Scholar with his books* with multi-burner metal hanging lamp. 1671. Oil on canvas, 64.5 x 49 cm. Budapest, Museum of Fine Arts. Retrieved from

http://commons.wikimedia.org/wiki/File:Gerbrand_van_den_Eeckhout_-Scholar_with_his_Books_-_WGA7468.jpg

Figure 167. Example of floating-wick Roman vase lamp, late period. 4rd century CE. Glass, 8 5/8 in diameter, folded in flared rim. Boca Raton, FL, Griffin Gallery Ancient Art. Image used with permission of Griffin Gallery Ancient Art. Retrieved from http://www.griffingallery.net/items/963761/en2store.html

Figure 168. Saint Luke with adjustable hanging vase lamp from the *Constantinople New Testament,* Gospel of Luke 1. Mid-10th century. Illuminated manuscipt. London, British Library, BL Add. 28815, fol. 76v. Courtesy of © The British Library Board. Retrieved from <u>http://www.bl.uk/onlinegallery/sacredtexts/constantinople_lg.html</u>

Figure 169. A Hazzan in a Spanish Synagogue reading the Haggadah under hanging float-wick oil lamps in *Sister Haggadah.* C. 1350. Illuminated manuscript. Vellum, 23.3 x 19 cm. London, British Library, Or. MS. 2884, fol. 17v. Courtesy of © The British Library Board. Retrieved from

https://imagesonline.bl.uk/en/asset/show_zoom_window_popup_img.html?asset=11840

Figure 170. Liturgical chanting beneath three lamps suspended from an arcade in the *Windmill Psalter* in initial C. 1280-1300. Illuminated manuscript. Vellum, 320 x 215 mm. New York, The Pierpont Morgan Library, MS M. 102, fol. 100r. Retrieved from <u>http://utu.morganlibrary.org/medren/single_image2.cfm?imagename=m102.100ra.jpg&page=ICA000004387</u>

Figure 171. Georges de La Tour. *Magdalene with the Smoking Flame* and detail of float-lamp. C. 1640. Oil on canvas, 117 x 92 cm. Los Angeles County Museum of Art. Image by permission of Dr. Emil Krén, Editor of Web Gallery of Art. Retrieved (page 1) from http://www.wga.hu/frames-e.html?/html/l/la_tour/georges/index.html

Figure 172. Drawing of Egyptian hieroglyph of a possible floating-wick lamp. C. 1353 BCE. Drawing by Sarah Dowhower of a depiction represented in Robins, 1939, p. 45.

Figure 173. Cresset-stone lamp with four cups. No older than 1172. Purbeck Marble, 9 ^{1/2} x 7 ^{1/2} x 5 in deep. Dorset, England, Bindon Abbey [now in Holy Rood Church, Wool]. Image used with permission of photographer David Day. Retrieved from http://people.bath.ac.uk/lismd/dorset/wool/fryer-1898.html

Figure 174. Crusie Lamp. n.d. Used by permission of Beth Maxwell Boyle. Retrieved from the Rams Horn Studio Early Lighting 2 website by: <u>http://www.ramshornstudio.com/early_lighting_2.htm</u>

Figure 175. Phoebe Lamp. Late 18^{th} -early 19^{th} century. Celtic cast iron double bowl design, height $12 \frac{1}{4}$ in., bottom bowl $2 \frac{1}{8} \times 4 \frac{1}{4}$ in. Used by permission of Hal Post. Retrieved from the Hals Lamp Post website:

http://www.halslamppost.com/Miscellaneous%20Lamps/slides/Double%20Crusie%20Oil %20Lamp.html

Figure 176. Betty Lamp with cover. C. 1820. Sheet steel. German and used by H. C. Kempt, Potter. Image used with permission and retrieved from The Old Time Lamp Shop website, Jamie Jones, Curator: <u>http://collectlamps.com/fat%20betty%20lamps.html</u>

Figure 177. Govanni Girolamo Savoldo. *St. Matthew and the Angel* and detail. 1534. Oil on canvas, 93 x 125 cm. New York, The Metropolitan Museum of Art. Image by permission of Dr. Emil Krén, Editor of Web Gallery of Art. Retrieved from http://www.wga.hu/frames-e.html?/html/s/savoldo/index.html

Figure 178. Trophime Bigot. *Young girl pouring oil into a lamp.* 1650. Oil on canvas. Rome, Galleria Doria Pamphili. Image in black and white with permission of Galleria Doria Pamphili. See in color at http://www.bridgemanart.com/image/Bigot-Trophime-c-1595-p-1650/Girl-pouring-oil-into-a-lamp-oil-on-canvas/07124988b4254580809e15e2b7f55f19

Figure 179. Frontispiece with Rabbi Gamaliel and students in the *Sarajevo Haggadah*. C. 1350. Illuminated manuscript in copper and gold. Vellum. Sarajevo, National

Museum of Bosnia and Herzegovina. Retrieved from Klawans (2010): http://thechristianity.wordpress.com/2010/03/31/was-jesus%E2%80%99-last-supper-a-seder/

Figure 180. Monk Sabas reads (with taper) to the Emperor Nicephorus III in the *Homilies of John Chrysostom.* 1071-1081. Illuminated manuscript, tempera and gold on vellum. Bibliotheque Nationale de Paris, MS. Coislin 79, fol. 1 (2 bis)r. Retrieved from http://commons.wikimedia.org/wiki/File:Nicephorus_III_and_Sabas_BnF_Coislin79_fol_2bis.jpg

Figure 181. Office for the Dead at Vespers, Requiem Mass in the *The Hours of the Umfray Family.* C. 1420. Iluminated manuscript. Parchment, 200 x 140 mm. London, British Library, Sloane 2468, fol. 115. Courtesy of © The British Library Board. Retrieved from

http://www.bl.uk/catalogues/illuminatedmanuscripts/ILLUMIN.ASP?Size=mid&IllID=6 554

Figure 182. Sébastien Bourdon. *Presentation in the Temple.* C. 1644. Oil on canvas, 71 x 61 cm. Paris, Musée du Louvre, Paris. Retrieved from http://upload.wikimedia.org/wikipedia/commons/6/6e/Bourdon%2C_S%C3%A9bastien_- Presentation in the Temple - c. 1644.jpg

Figure 183. Charles Spencelayh. *The Last Night of Hanukkah.* Before 1958. Oil on canvas. Private Collection. Retrieved from <u>http://www.linneoart.com/blog/?cat=23</u>

Figure 184. Asaf al-Daula. *The Muharram Festival in Lucknow:* Listening at night to the maulvi reading from the scriptures. India, Nawab of Oudh. C. 1795. London, British Library. Retrieved from <u>http://en.wikipedia.org/wiki/File:Asif_muharram_1795_1.jpg</u>

Figure 185. Barthel (Bartholomäus) Bruyn The Elder. *Vanitas Still Life.* 1524. Oil on wood, 61 x 51 cm. Otterlo, Rijksmuseum Kröller-Müller. Retrieved from http://commons.wikimedia.org/wiki/File:Barthel_%28Bartholom%C3%A4us%29_Bruyn - Vanitas.JPG

Figure 186. Rembrandt. *Student at a Table by Candlelight.* 1642. Copper etching, 14.8 x 13.5 cm. Boston, Museum of Fine Arts. Retrieved from http://www.wikipaintings.org/en/rembrandt/student-at-a-table-by-candlelight-1642

Figure 187. Josef Israëls. *The Philosopher* (An Old Man Writing by Candlelight). 1885-1899. Oil on canvas, 65 x 54.6 cm. London, National Gallery. Image used with permission. Retrieved from <u>http://www.nationalgallery.org.uk/paintings/jozef-israels-an-old-man-writing-by-candlelight</u>

Figure 188. Gerard Dou. *Astronomer by Candlelight.* Late 1650s. Oil on panel, 12 5/8 x 8 3/8 in. Los Angeles, J. Paul Getty Museum. Retrieved from http://cgfa.acropolisinc.com/dou/p-dou30.htm *Figure 189.* Jan van der Meer van Utrecht. *Singing Couple.* Before 1697. Oil on canvas, 79 x 63.5 cm. Private Collection. Retrieved from http://commons.wikimedia.org/wiki/File:Jan van der Meer - Singing Couple.jpg

Figure 190. Matthias Stomer (Stom). *Young Man Reading by Candlelight.* Before 1649. Oil on canvas. Stockholm, National Museum. Retrieved from <u>http://uk.wikipedia.org/wiki/%D0%A4%D0%B0%D0%B9%D0%BB:Matthias_stom_yo</u>ung man reading by candlelight.jpg

Figure 191. Hendrick Terbrugghen. *Old Man Writing by Candlelight.* 1623-1627. Oil on canvas, 65.7225 x 52.705 cm. Northampton, Smith College Museum of Art. Image used with permission. Retrieved from http://museums.fivecolleges.edu/detail.php?museum=all&t=objects&type=all&f=&s=Terbrugghen&record=0

Figure 192. French School. *Portrait of a Man by Candlelight.* 18th century. Oil on canbas, 61.6 x 50.8 cm. Originally owned by Cleveland Museum of Art; sold in Sotheby Auction, 2011, Lot 41. Owner unknown. Retrieved from http://www.mutualart.com/Events/Auctions/Old-Master---19th-Century-European-

Art/74157FB838B13453/AuctionResults

Figure 193. Joseph Wright of Derby. *A Young Girl Reading a Letter with an Old Man Reading over her Shoulder.* 1767-1770. Oil on canvas, 76.5 x 63.5 cm. Private Collection. Retrieved from

http://commons.wikimedia.org/wiki/File:Joseph_Wright_of_Derby._A_Young_Girl_Rea ding a Letter, with an Old Man Reading over Her Shoulder. c. 1767-70.jpg

Figure 194. Johann Monles Culvershouse. *Reading the News.* 1860. Oil on canvas, 50.48 x 75.57 cm. Private Collection. Courtsey of Chris McCormick, The Athenaeum. Retrieved from http://www.the-athenaeum.org/art/full.php?ID=16615

Figure 195. William Hogarth. *The Politician (Shortsighted Man).* 1775. Engraving. Inscribed on plate is: "Will.m Hogarth, Inv.t. Etch'd by J. K. Sherwin. Etch'd from an Original Sketch of Wm. Hogarth's, in the Possession of Mr. Forrest. Pub'd as the Act direct by Jane Hogarth, Oct. 31st, 1775." Paper, 18.5 x 14.8 in. Image used with permission. Retrieved from Darvill's Rare Prints website: http://www.darvillsrareprints.com/Hogarth%20The%20Politician.htm

Figure 196. J. H. Clark. *Shooting the Harpoon at a Whale.* C. 1814. Colored engraving. Unknown owner. Retrieved from http://en.wikipedia.org/wiki/File:Shooting the Harpoon at a Whale - J.H. Clark.png

Figure 197. Georg Friedrich Kersting. *Man Reading by Lamplight* with a French Bouillotte lamp. 1814. Oil on canvas, 48 x 37 cm. Winterthur, Oskar Reinhart Collection. Retrieved from http://commons.wikimedia.org/wiki/File:Georg Friedrich Kersting -

Man_Reading_at_Lamplight_-_WGA12122.jpg

Figure 198. Argand central glass chimney lamp. n.d. Drawing. German. Retrieved from <u>http://commons.wikimedia.org/wiki/File:Argand01.jpg</u>

Figure 200. Georg Friedrich Kersting. *The Elegant Reader* with an Argand lamp. 1812. Oil on canvas, 47.5 x 37.5 cm. Weimar, Schlossmuseum. Retrieved from *http://commons.wikimedia.org/wiki/File:Kersting_-_Der_elegante_Leser.jpg*

Figure 201. John Fredrick Peto. *Still Life with Book, Lard Lamp, Pipe, and Match.* Early 19th century. Oil on board, 22.86 x 15.24 cm. Private Collection. Courtsey of Chris McCormick, The Athenaeum. Retrieved from <u>http://www.the-</u> athenaeum.org/art/full.php?ID=14371

Figure 202. Samuel Finley Breese Morse. *Portrait of Noah Webster.* Before 1872. Oil on canvas, 84.7 x 72.7 cm. New Haven, CN, Beinecke Rare Book & Manuscripts Library, Yale University. Retrieved from http://commons.wikimedia.org/wiki/File:Portrait of Noah Webster.jpg

Figure 203. Noah Webster's lard oil lamp: One of a pair used to compile his dictionary. 1941. Photo. In Flashback: Lamps and illuminants by Eugene Clute originally published in the September 1941 issue of *American Collector Magazine*. Image used with permission. Retrieved from *American Collector Weekly* Archive website of March 26th, 2009: http://www.collectorsweekly.com/articles/lamps-and-illuminants/

Figure 204. John Graham Gilbert. *William Murdoch (Murdock).* Before 1866. Reproduction of the original portrait, 10.4 x 8.1 cm. Birmingham, UK, City Museum and Art Gallery. Retrieved from

http://en.wikipedia.org/wiki/File:William_Murdoch_%281754-1839%29.jpg

Figure 205. Paul- Gustave Dore and Blanchard Jerrold. *Scripture Reader in a Night Refuge* (Poor House) from *London: A Pilgrimage.* 1872. Engraving. Retrieved from http://www.cf.ac.uk/encap/skilton/illustr/Dore143.html

Figure 206. Richard Carlton Woodville. *Politics in an Oyster House.* 1848. Oil on canvas, 40.6 x 33 cm. London, Walker Art Gallery. Courtsey of Chris McCormick, The Athenaeum. Retrieved from <u>http://www.the-athenaeum.org/art/full.php?ID=20768</u>

Figure 207. Mary Cassatt. *Under the Lamp.* C. 1882. Soft-ground etching and aquatint in black on cream wove paper, 192 x 218 mm. Chicago, Institute of Art. Retrieved reproduction from <u>http://en.wahooart.com/A55A04/w.nsf/Opra/BRUE-8BWURH</u>

Figure 208. Sir William Orchardson. *Her Mother's Voice.* 1888. Oil on canvas, 1016 x 1486 mm. London, Tate Gallery. See at the Tate Gallery at http://www.tate.org.uk/servlet/ViewWork?cgroupid=999999961&workid=10956&search_id=13539

Figure 209. Marc Chagall. *The Smolensk Newspaper.* 1914. Oil and graphite on paper mounted on canvas, 37.9 x 50.2 cm. Philadelphia Museum of Art. Retrieved from http://www.wikipaintings.org/en/marc-chagall/the-smolensk-newspaper-1914

Figure 210. Pierre Bonnard. *Under the Light of the Lamp.* 1899. Oil on cardboard, 34 x 44 cm. Paris, Musee d'Orsay. Retrieved from Ciudad de la Pintura website: http://pintura.aut.org/SearchProducto?Produnum=19307

Figure 211. Cleveland study lamp. Signed & Patent Dated 1863-1871-1873. Nickel over brass. Photo retrieved from the Richard Miller Lamp site: http://richardmillerlamps.com/studentlamps.htm

Figure 212. Paul Signac. *Woman with Lamp.* 1890. Oil on wood, 0.261 x 0.166 m. Paris, Musée d'Orsay (RF 1976 78). Donation of Mrs. Ginette Signac, 1976. Used with permission. Retrieved from <u>http://www.musee-orsay.fr/en/collections/index-of-works/resultat-</u>

collection.html?no_cache=1&zoom=1&tx_damzoom_pi1%5Bzoom%5D=0&tx_damzoo m_pi1%5BxmlId%5D=003019&tx_damzoom_pi1%5Bback%5D=en%2Fcollections%2F index-of-works%2Fresultat-collection.html%3Fno_cache%3D1%26zsz%3D9

Figure 213. Peter Vilhlem Ilsted. *Little Girl Reading and Knitting.* C. 1913. Color Mezzotint, 13 ¹/₄ x 11 5/8 in. Retrieved from Kodner Auction Catalogue #44 for 5/12/2010 website: http://www.kodner.com/catalogue/051210/catalogue1.html

Figure 214. The Rochester. 1891. Newsprint, 6 x 15 cm. Advertisement for The Rochester Lamp Co. Photographer, Sarah Dowhower.

Figure 215. Harriet Backer. *By Lamplight.* 1890. Oil on canvas, 64.7 x 66.5 cm. Bergen, Norway, Kunstmuseum. Image courtesy of Mark Harden, Artchive Web Gallery. Retrieved from <u>http://www.artchive.com/web_gallery/H/Harriet-Backer/By-Lamplight-1890.html</u>

Figure 216. Knut Ekvall. *The Reading Lesson.* 1912. Oil on panel, 60.2 x 75.5 cm. Private Collection. Image courtesy of the Art Renewal Center, Fred Ross, Chairman. Retrieved from http://www.artrenewal.org/pages/artwork.php?artworkid=10928&size=large

Figure 217. Pablo Picasso. *Portrait of Joseph Cardona.* 1899. Oil on canvas, 100 x 63 cm. Paris, Collection of Alex Maguy. Retrieved from Ciudad de la Pintura website: http://pintura.aut.org/SearchProducto?Produnum=28790 *Figure 218.* Pablo Picasso. *Still Life with Skull (Crane), Book, and Oil (Petroleum) Lamp.* 1946. Oil on plywood, 54 x 65 cm. Lyon, Beau-arts de Lyon Musée. Retrieved from http://www.wikipaintings.org/en/pablo-picasso#supersized-still-life-223843

Figure 219. Juan Gris. *Still Life with an Oil Lamp.* 1911-1912. Oil on canvas, 48 x 33 cm. Otterlo, Netherlands, Kröller-Müller Museum. Retrieved from http://www.wikipaintings.org/en/juan-gris/still-life-with-oil-lamp-1912

Figure 220. Joan Miro. *The Kerosene Lamp.* 1924. Charcoal with red Conte and colored crayons, white oil paint on canvas, 810 x 1003 mm. Chicago, Institute of Art. Photo used with permission of photographer, Mingqi Ge. Retrieved from http://www.flickr.com/photos/noctilux-mingqi/5410159933/

Figure 221. Quint Buchholz. *Book Lighthouse.* 1992. Ink/pen, 24 x 15.4 cm. Artist's Collection. Image used with permission of artist. Retrieved http://www.quintbuchholz.de/en/pictures/1991-2000.html

Figure 222. Benjamin West. *Benjamin Franklin, Drawing Electricity from the Sky.* C. 1816. Oil on canvas, 34 x 25.6 cm. Philadelphia, Museum of Art. Retrieved from http://commons.wikimedia.org/wiki/File:Franklinwithkey.jpg

Figure 223. Craigside House, Newcastle, Northumberland, UK. 2005. Photo by Glen Bowman and retrieved from http://en.wikipedia.org/wiki/File:Cragside1.jpg

Figure 224. Sir William Armstrong in his Study. 1881. Illustration in the *Graphic Newspaper*, London. The image is reproduced in *William Armstrong, Magician of the North* by Henrietta Heald (Northumbria Press, 2010). Image used with permission. Retrieved from http://www.williamarmstrong.info/science

Figure 225. Abraham Archibald Anderson. *Thomas A. Edison.* 1890. Oil on canvas, 114.3 x 138.7 x 2.5 cm. Washington DC, National Portrait Gallery. Image used with permission of photographer David Cowhig. Retrieved from http://www.flickr.com/photos/74568056@N00/5892776241/

Figure 226. John Sloan. The *New Homestead.* 1930. Tempera and oil on panel, 24 x 32 in. New York, Gerald Peters Gallery and Kraushaar Galleries. Photo courtesy Gerald Peters Gallery and Kraushaar Galleries, New York, NY. Retrieved from http://www.gpgallery.com/works/view/2565/206/0/0/0/0/0/1/9

Figure 227. Frank Weston Benson. *The Camp.* 1925. Oil on canvas, 55.9 x 71.1 cm. Private Collection. Image courtesy of the Art Renewal Center, Fred Ross, Chairman. Retrieved from

http://www.artrenewal.org/pages/artwork.php?artworkid=39626&size=large

Figure 228. Han-Wu Shen. 2007. *Quiet Night.* Oil on canvas, 71 x 91 cm. Collection of Akshay Sanghavi. Image courtesy of the Art Renewal Center, Fred Ross, Chairman.

Retrieved from

http://www.artrenewal.org/pages/artwork.php?artworkid=38378&size=large

Figure 229. Pablo Picasso. Reading at a Table. 1934. Oil on canvas, 162.2 x 130.5 cm. New York, The Metropolitan Museum of Art. Retrieved from http://www.metmuseum.org/works_of_art/collection_database/modern_art/reading_at_a_table/objectView.aspx?&OID=210006954&collID=21&vw=0

Figure 230. Norman Rockwell. *And Daniel Boone Comes to Life on the Underwood Portable* detail. 1923. Oil on canvas. Private Collection of Steven Spielberg. The painting is the first Rockwell purchased by Spielberg. Retrieved from <u>http://newsdesk.si.edu/photos/norman-rockwell-and-daniel-boone-comes-life-underwood-portable</u>

Figure 231. Roy Lichtenstein. *Still Life with Lamp.* 1976. Oil and magna on canvas, 54 x 74 inches. Private Collection. Image courtesy of Mark Harden, Artchive Web Gallery. Retrieved from <u>http://www.artchive.com/artchive/L/lichtenstein/lichtenstein_lamp.html</u>

Figure 232. Janet Fish. *Barry (The Poet).* 1982. Oil on canvas, 60 x 65 cm. Private Collection. Image permission © Janet Fish/Licensed by VAGA, New York, NY. <u>www.vagarights.com</u>. Retrieved from <u>http://www.askart.com/AskART/artists/search/Search_Repeat.aspx?searchtype=IMAGE</u> S&artist=34511

Figure 233. Deborah DeWit Marchant. *Evenings at Home.* 2005. Private Collection. Image courtesy of the artist. See at <u>http://www.simplemindscards.com/Readers.html</u>

Figure 234. Deborah DeWit Marchant. *Friday Nights.* 2006. Pastel, 22 x 26 in. Private Collection. Image courtesy of the artist. See at *http://www.deborahdewit.com/index.php/image-detail?fID=53*

Figure 235. Jan Steen. *Rhetoricians at a Window.* 1661-1666. Oil on canvas, 75.9 x 58.6 cm (according to PMA). Philadelphia Museum of Art. Retrieved from http://commons.wikimedia.org/wiki/File:Steen Rhetoricians at a Window.jpg

Figure 236. Gerrit van Honthorst. *Old Woman Examining a Coin by Lantern.* 1623. Oil on canvas, 75 x 60 cm. The Kremer Collection. Image courtesy of George Kremer. See at <u>http://www.thekremercollection.com/art/artists/Gerrit-van-Honthorst/Old-woman-</u> examining-a-coin-by-a-lantern-%28Sight-or-Avarice%29/

Side Bars

- Side Bar 1: Struggling to See Text: 3 Major Vision Problems
- Side Bar 2: Dioptric Correction vs. Magnification
- Side Bar 3: Myopia Mystique

- Side Bar 4: Single Lens Challenge
- Side Bar 5: Bespectacled Women
- Side Bar 6: The Bigger the Better
- Side Bar 7: Tinted Tidbits
- Side Bar 8: Jerome, the Anachronism Icon
- Side Bar 9: The White Wall Effect
- Side Bar 10: Awesome Slide Shows
- Side Bar 11: Jefferson's Spectacle Innovations
- Side Bar 12: Age-Old "Do-It-Yourself" Spectacle Fitting
- Side Bar 13: Fictional Characters with Glasses—Here Are the Rules
- Side Bar 14: Light Was Work!
- Side Bar 15: Vanitas Candles
- Side Bar 16: Lighting the Light
- Side Bar 17: The Non-Explosive Lamp Company

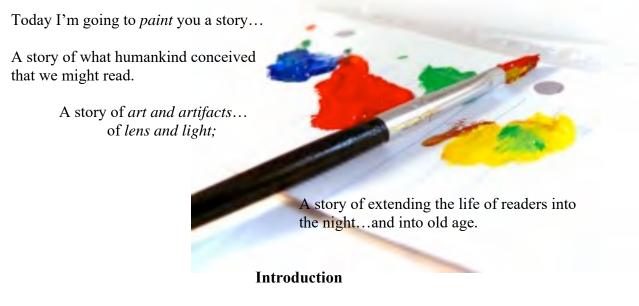
Acknowledgements

I would like to thank Roseanne Worrell for the many hours of proofing and editing she put into this manuscript. What an eagle eye for typos and tense issues!

I also would like to convey my appreciation to Dr. David Fleishman curator of the wonderful online museum and encyclopedia, *Antique Spectacles & Other Vision Aids* at <u>http://www.antiquespectacles.com/</u> Without the information, resources, and images he provided personally and at his website, <u>and</u> Dr. Fleishman's expert advice and input, I would not have been able to provide such a comprehensive history of vision aids.

Most of all, there are no words to express my gratitude to my husband Craig Edwards for all his editing suggestions and extreme tolerance and patience through the writing and editing process. I even forgive him for mistakenly not backing up my desktop files!

Painted Literacy: Lens and Light Celebrating the Tools that Help Us See Text



To be concise, I would like to picture for you through *works of art*, the long line of *tools and technologies* that have defined our literacy history and practices and helped us to see and process text better. This story of lens and light has three parts: the evolution of (a) early vision aids (b) double lens spectacles (both of which help focus the words), and (c) illumination tools (that brighten the page).

Theoretical Framework

Before I chronicle the development of these vision aids that have extended our literacy lives, let me first *frame*, so to speak, a short rationale as to why this might be important to consider. For the theoretical background I draw from the work of the Literacy Research Group at Lancaster University (Barton, Hamilton, & Ivanic, 2000) and Christina Haas (1996).

The *socially situated literacy* scholarship of David Barton and his group of researchers (Barton, Hamilton, & Ivanic, 2000) speaks to the significance of studying broad literacy *practices*, literacy *events* that reflect these practices, and specific texts that are part of those events. Thus, "literacy practices are best understood as a set of social practices; these can be inferred from events which are mediated by written text" (p. 8).

Situated literacy practices involve reading and writing with different:

- 1. *Purposes* (communication, information production and retrieval, religious intent, education, aesthetics, recreation, organization, critique, etc.);
- 2. Domains (school, church, workplace, home, library, sports venue, etc.);
- 3. *Habits* (listening vs. speaking, oral vs. silent, individual vs. group; active vs. passive, intensive vs. extensive);

- 4. *Participants* (male/female, religious/secular, rich/poor, literate/illiterate, etc.) as well as;
- 5. Varying *values and beliefs* about literacy.

Christina Haas (1996) argued that the best way to understand these literacy practices is to study their artifacts or what she calls " the *materiality of literacy*." She viewed literacy as language made material and "through writing, the world of tools and artifacts is joined to the symbolic world of language" (p. 3). Thus, the "acts of reading and writing...are inescapably technological" (p. 205).

Supporting the importance of materiality, Baron (1999) maintained that writing (viz., the alphabet) was the first technology of literacy and that "the computer is simply the latest step in a long line of writing technologies" (p. 17). We often lose sight of the small incremental developments made in writing technologies. They are so subtle that they become culturally transparent and natural to us. Consequently, we do not see them as *technological* (Baron, 1999; Haas, 1996).

New literacy technologies begin in a restricted community with only a small number of participants. Often involving a high cost and status/elitist power structure, users keep the technology to themselves, but over time gradually extend it to the larger general community. Consequently, cost decreases and the technology become familiar, spreads across populations and becomes a natural form of communication (Baron, 1999; Haas, 1996). Witness the development and dissemination of computers from the elite to the masses over the last 30 years—recently, the E-book and smart phone phenomena.

As each new literacy form and surface (from clay tablets to electronic tablets) evolved, a plethora of supporting technologies and materials developed: writing tools and accessories designed to accompany each form, furniture specifically built for different reading/writing activities, preservation devices crafted for storage and protection, and lights and vision aids invented to improve ability to see text. Together, these technologies and artifacts are indelibly tied to literacy practices and how people go about the business of reading and writing in daily life, driving our historical practices and ultimately, shaping innovative practices to come.

Essentially, "to understand contemporary literacy it is necessary to document the ways in which *literacy is historically situated*; literacy practices are as fluid, dynamic and changing as the lives and societies of which they are a part" ((Barton, Hamilton, & Ivanic, 2000, p. 13). However, "...change and time in literacy practices can often be overlooked because both are particularly difficult to document" (Tusting, Ivanic & Wilson, 2000, p. 217). Thus, historical written and associated archaeological evidence are critical in helping us *situate* or create the past. *Art representations*, in particular, provide vivid and lush images of reading and writing activities and artifacts in action over centuries and across cultures: the context giving meaning to literate behaviors in each unique snapshot of time, place, and people.

The Gift of Art to Literacy

In truth, artists, quite unintentionally and serendipitously, have given the world a huge gift. They have put literacy practices, at the heart of thousands of paintings from ancient to contemporary times, literally making reading and writing come to life. For reading educators, historians and art aficionados these artistic works of people reading and writing through the ages are:

- 1. A proverbial feast for the eyes,
- 2. A critical source of what we know about how people learned to become literate,
- 3. A *powerful provenance* of the changing nature over time of both public and private literacy practices, and
- 4. A detailed *visual record* of the long line of literacy technologies and associated artifacts—the stuff of literacy.

The Stuff of Literacy

Indeed, the *stuff of literacy* entails hundreds of artifacts. As I researched the amazing array of these, I found the examples fell into six categories as shown in Figures 1-6. Because of the extensive nature of literacy artifacts, I will explore in this paper only the latter two categories, viz., *Vision Aids* and *Illumination*, and how these tools of lens and light have better-improved mankind's ability to see text—through the eyes of artists.





WRITING TOOLS AND ACCESSORIES









Figure 5





Earliest Vision Aids

From the inception of writing some 4000 years ago in the 19th century BCE, the process of reading and writing had to be difficult as literates aged (*Side Bar 1*). Supposedly lacking tools to enhance their vision, Cicero (106-43 BCE) and several other Roman authors wrote complaining about their weakening eyesight and how they had to be read to by literate slaves, as they grew older.

However, fresh analysis of both new and old documents and archeological evidence in the last few decades suggests that the ancients—*whether with normal or poor eyesight*— did use various means to improve their vision of text. We know that some sort of magnification had to exist because of the numerous examples of microscopic writing and carving from antiquity that still exist today or were documented in early writings (Enoch, 2007; Ilardi, 2007; Rosenthal, 1996; Temple, 2000; Willach, 2008). Let me give you three examples:

The world's first readers and writers living in the Mesopotamia region were scribes who were accountants and secretaries. They worked with excruciatingly tiny cuneiforms on small clay tablets that they cradled in their hands (Fischer, 2003). (Picture our current smart phones or PDAs!) Writing was so tiny (micro) that the text would have been impossible to read by the naked eye. Figure 7 shows one such tablet an issuing of barley ration (c. 2350 BCE).

In another instance, archeologists working at the Dead Sea Scroll excavation in Qumran unearthed several tefillins (phylacteries) from the 1st century CE with Hebrew so minute

that (except for a severely myopic condition) only a magnification of the writing makes it legible (Enoch, 1998). (See Figure 8 and Footnote 1 .)

Struggling to See Text: 3 Major Vision Problems

- **Hyperopia (farsightedness)**
 - Inability to see close writing clearly
 - Type of refractive error as light hits the retina
 - Problem exacerbated at night when eyes are tired or light is dim
 - Corrected with convex lenses
 - Improved with better light
- Myopia (nearsightedness)
 - Inability to see text far away clearly
 - Type of refractive error as light hits the retina
 - Problem exacerbated at night when eyes are tired or light is dim
 - Corrected with concave lenses
 - Improved with better light
- Presbyopia (meaning 'the eyes of the old' in Greek)
 - Slow loss of the ability to actively focus on close text
 - Generally due to normal aging; lens become less flexible and loses elasticity
 - Corrected with non-prescription reading glasses that magnify letters
 - Improved by increasing the available light.
 - May well have been the impetus for single and double lens vision aids development in the 1200s.

Side Bar 1

In the same century, Pliny the Elder (23-79 CE) in his *Natural History* (77 CE) noted that Cicero (in a lost manuscript dated 1 BCE) wrote of a parchment copy of Homer's poem *The Iliad* that was written in micro-script enclosed in a nutshell (Temple, 2000). The famous phrase "in a nutshell" survives today.

> Figure 7. Cuneiform clay tablet



Figure 8. Qumran microscopic tefillin



The big question is what did early writers and readers use?

Water Globes

Our first hint is textual: Seneca, the Younger (c. 4-65 CE) the Roman Philosopher wrote of the magnification of text by use of water globes, i.e., an enhanced water-based reading tool. In his book *Natural Questions* he said, "Letters, however small and obscure, are seen larger and clearer through a glass ball filled with water...." (as cited in Ilardi, 2007, p. 42). Allegedly, Seneca boasted that he read "all the books of Rome" by viewing the pages through the water.

8

Somewhat later, Christian Father Clement of Alexander (2nd Century CE) wrote about enlarged "images seen through the water, and things seen through pellucid [clear] and transparent bodies" (as cited in Temple, 2000, p. 78).

In his book The Crystal Sun, Robert Temple (2000), demonstrated the magnification

power of a tiny Roman glass globe from the Bonn Museum. When he filled the ball with water and held it over text, the letters appeared much larger (Figure 9).

Many scholars believe these tiny pocket-sized balls along with the sun, served as burning-globes for cauterizing wounds and starting fires. Temple (2000) suggests that hundreds of these Roman mass-produced items owned by museums actually have been mislabeled as make-up globes (also called toilet globes) used for holding of perfumes and other items for women.

Mirrors

Seneca, the Younger also alluded to the use of mirrors as vision enhancing tool for reading and close work (Ilardi, 2007). As an artifact, mirrors are actually far older than glass spheres.

Figure 10 is a photograph of the oldest extant mirror. Found in south-central Turkey and manufactured 8,000 years ago (Enoch, 2006, 2007, 2009) from obsidian (a type of dark igneous volcanic glass), the mirror shows an image

of the woman holding the mirror. Some mirrors were slightly concave and clearly could have been used for magnification.

Although there is little written evidence attesting to mirrors as vision aids, scholars believe they "played a lengthy and important role in early vision corrections as magnifiers" (Enoch, 2006, p. 775) for an extended period before we had spectacles—enlarging and enhancing faded lettering. Pliny the Elder, the Roman historian speaks of mirrors held perpendicular to improve images in the 1st century CE (Rosenthal, 1996). Around 1280 CE, Heinrich Frauenlob (1250/1260-1318), Middle High German poet, wrote a poem describing how writing can be made readable for an old person with the use of (presumably concave) mirrors (Rosenthal, 1996) and about the same time French author Jean de Meun (c. 1250-1305) discussed "the marvelous powers that all things that are very small—thin letters, very narrow writing...are seen as so great and large and are put so close to the observers...that one can read them...." (as cited in Ilardi, 2007, p. 44).

In addition to magnification, readers and writers used mirrors for a second reason: their substantial properties of illumination—a topic I will address in the last part of this paper.



Funde und

im Be. Archäologische Ba



Figure 10. Oldest surviving

mirror

"A mirror was thought to focus and concentrate light, and reflect it on to one's desk to help one in one's reading" as well as continuous writing (Thornton, 1997, pp. 167-168).

Far earlier in history, mirrors (like water globes) were commonly used as combustion and cauterizing agents, but were also part of another unique literacy practice—that of capturing the reflection of the sun to melt the wax of tablets (Figure 11). The light, in



effect, erased the text on the wax surface; once hardened, the blank surface could be reused for writing, much like the modern eraser or the computer delete key does today.

Classical and medieval images in art, suggest that mirrors with concave shaped surfaces were made usually out of metal and then subsequently, glass. Some look amazingly similar to our hand-mirrors (Figure 12) and stemmed magnifying

Figure 12. Modern hand mirror



mirrors of today (Figure 13).

The major challenge of using a mirror to enlarge text is that the image is reversed. Two adaptive reading practices evolved over centuries to solve the problem.



First was the cultivation of the skill of reading and writing in reverse images. Indeed, medieval reader/writers as well as early printers and engravers were quite adept at working with mirror images and did so routinely. For instance, we know Leonardo da Vinci wrote in Italian in reverse (right to left) and his writings are quite "legible by the aid of a mirror" (Frugoni, 2003, p. 7).

Another practice was the use of a second mirror to right the enlarged image of script. In 1589, Giambattista della Porta in his *Magia Natural* described the 2-mirror process of reading:

To my surprise and delight, my experiment with a makeup mirror and a hand mirror (Figures 12 and 13) allowed me to enlarge almost a whole page at a time so as to be quite readable. However, this technique could only be used for reading because with my hands full, writing was out of the question.

As to painted depiction of mirrors, we have a few ancient examples pictured on Greeks vases and in Roman frescos. Generally, the images were of various Gods (Aphrodite, Laso and Eros) whose attributes or symbols were mirrors, as in Figure 14. While there is a smattering of depictions of mirrors in illuminated manuscripts between 1185-1350, no paintings associated mirrors with real-life literacy practices until a groundbreaking Italian fresco (Figure 15) in 1352 was painted by Tommaso (Tomaso) da Modena (c. 1325-1379). Figure 14. *Aphrodite* with hand mirror



On the north wall in the Chapter House of the San Nicoló Monastery at Treviso, Italy (Figure 16), Tommaso depicted a concave mirror flanked with writing equipment, implying the tool's reflective ability to ease the eyes and magnify the letters. On a shelf above the tonsured miracle-worker St. Pietro Isnardo of Chiampo (or Vicenza) (c. 1200-

1244), stands a concave reading mirror mounted on a metal stand accompanied by a pen and inkpot on a little ledge below. The mirror looks surprising like our modern makeup mirrors.

In all, Tommaso pictured 40 real-life Dominican Order dignitaries seated in their tiny cells either studying or composing. The cells formed a single row ringing four walls below the wooden ceiling of the Monastery Chapter House. The illustrious figures Figure 15. San Nicoló Chapter House with Tommaso fresco



dressed in similar dark brown cloaks over white habits are seated at large yellow desks surrounded by writing/reading materials, engaged—but isolated from each other—in some scholarly pursuit. As you will see from other of these wall portraits to be described further on, it is hard not to characterize this wonderful fresco as the most seminal artistic representation in the history of optics and literacy!



Gibbs (1989) posits that Isnardo's concave "reading glass" despite its bothersome "habit of reversing text" was used regularly as an important tool in the Middle Ages and Renaissance for enlarging small and faded handwriting (p. 85). Early Renaissance manuscript illuminations of other noted authors in scriptorium scenes give credence to this idea. For example, in an author portrait of the late 1400s (Figure 17), Dominican author Vincent of Beauvais (c. 1190-1264?) is shown

Figure 16. *Saint Isnardo* and detail of a medieval magnifying mirror



Figure 17. Detail of Beauvais composing and of his enlarging mirror





composing his book in a frontispiece of *Speculum Historiale* in his study. A concave mirror stands prominently behind his slanted writing desk, suggesting (like Isnardo) that Vincent depended on the vision aid to magnify and reduce eyestrain as he wrote (see Footnote²). (Take note of the many other literacy artifacts, including bookshelves with highly decorated manuscript covers, scroll, page weights, and pen.)

Shortly after Isnardo's portrait, Tommaso (1352) painted another fresco on a column in the left nave of the attached Treviso Church of San Nicoló. Included in St. Jerome's writing paraphernalia was a unique type of mirror for magnification of letters—rarely seen today (Figure 18 and detail).

Figure 18. Jerome in His Study with horned shaped mirror detail



Above the book to the right is a small reading mirror in a horned-shaped leather case probably filled with sand for balance. Ilardi (2008)

said the mirror seems placed "at the right angle for focusing and enlarging letters" (p. 276) and argued that this is possibly the first depiction in Western



painting of a horn-shaped reading mirror.

Some 100 years later, in a remarkable painting by Niccolo Colantonio (active 1440-c. 1470) of Jerome (1445) amid his scholarly clutter, a much larger horned-shaped mirror (Figure 19 and detail) sits in the corner of his desk. Tommaso and Colantonio's two paintings are noteworthy because they begin the motif of using still life literacy

objects (books, writing equipment, etc. in niches) in a private intimate space to depict and identify a place of sacred learning.



Figure 19. *Jerome in His Study* and detail of horned-shaped mirror by Colantonio



Jerome's horn-shaped mirror is very similar to one pictured in a woodcut picturing standard calligraphy equipment for writers and scribes in the 1500s (Figure 20 and detail).

In his book Libro nuovo d'imparare a scrivere (A New

Book for Learning to Write) originally published in 1540, Giovanni Battista (Giambattista) Palatino (c.1515-c.1575) extoled the virtues of mirrors. After discussing various tools of a scrivener including a compass, square, ruler, scissors, string, seal, he declared "the mirror is used to save the sight and to assist it in continuous steady writing. It is much better of glass than of steel." (as cited in Frugoni, 2003, p. 7; Ilardi, 2007, p. 45). Noteworthy to this discussion on early vision enhancement is the chapter that Palatino included on mirror writing (Mellby, 2008). Indications are that by the 16th century mirrors were "almost obligatory in the study" and that their literacy Figure 20. Standard calligraphy equipment and detail of horn mirror (1540)



related application gradually declined "with the common use of optical lenses and spectacles" (Thornton, 1997, p. 168).

Reading Stones

As the beryl enlarges writing to read in it... It grows high, broad, wide and also long. (Albrecht von Scharfenberg, 1270, as cited in Andressen, 1998, p. 12)

It (i.e. the crystal) has in it such great powers That be writing ever so small, It looks larger in it; If this stone thought about it and encroached If someone ground it thin and wanted to hold it on the writing, he would see through it the little letters look bigger. (Konrad of Wurzburg, 1270, as cited in Andressen, 1998, p. 12)

Prior to water globes and mirrors, many experts argue that the first reading aids used by the ancients to improve sight were actually clear natural pebbles, referred to as *reading stones*. Also called, *magnifying stones*, these transparent rocks made from rock crystal, quartz or beryl, were our first simple magnifiers. Generally flat on one side and strongly convex on the other (called plano-convex), they were laid flat-side down directly onto the letters to enlarge them, as in this example owned by the Zeiss Optical Museum in Oberkochen, Germany (Figure 21).

Figure 21. Reading Stone



Literacy sources describing the use of stone readers are scarce. The oldest extant reference was by Aristophanes, a Greek playwright and a contemporary of Plato and

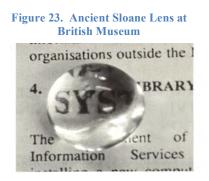


Socrates in 427 BCE who mentioned the use of a fine transparent stone with which fires are kindled and writing is melted away on wax tablets (Rosenthal, 1996, p. 389). Alhazen (956-1039) gave a description of "spherical glass segment used to correct defective vision" (Daxecker, 1997, p. 177). The next written references were in the mid-13th century in the two German poems (see above). However, there is widespread archeological evidence as far back as the Bronze Age of hundreds of highly polished plano-convex lens suitable for reading and other close

work—from ancient Egypt, to Troy, Crete, Assyria, Germany and Scandinavia. Often these objects have been or are hidden away in museums, never analyzed for optical properties and mistakenly labeled as jewelry or decorative objects (Enoch, 2007; Ilardi, 2007; Rosenthal, 1996; Temple, 2000; Willach, 2008).

A direct descendant of the reading stone is the modern paperweight or dome magnifier that both magnifies and gathers in light for crisper, brighter reading. Contemporary readers use this *magno-illuminator* in the same way as the early reading stone (i.e. placing it directly over the text); however, instead of a rock crystal, quartz or beryl, the dome is made of glass or acrylic. Figure 22 is one such example.

Temple (2000) identifies one of the Sloane lens in the Natural History Museum, London, as a remarkable example of an ancient reading stone that is a magno-illuminator. Made of rock crystal, the lens has a domed top that is completely transparent. In a dim room the illumination is doubled on the portion of the text one is reading simply by placing the lens upon the print and; the print is enlarged 2 $\frac{1}{2}$ to 3 times as shown in Figure 23.



A rare depiction of reading stones was painted by Ludwig Konraiter at Innsbruck, Austria in a gothic altarpiece showing scenes of the life of St. Mary and St. Ursula (1485–1490) (Figure 24 and detail). On the far right among 10 women saints, Saint Ottilia is looking down at two reading stones resting on an open book. Konraiter cleverly depicted how the two reading stones placed on each page of the book magnify the words underneath. This may well be the oldest painting of a woman reading with *any optical device*.

Saint Ottilia (Odilia) of Alsace (660-c. 720 CE) was an Abbess who was born blind and miraculously regained her vision when baptized as an infant. Consequently, the Catholic Church named her the patron saint of sufferers of eye disease—celebrating her on December 13th. Most representations of Ottilia show her holding a book with actual

eyeballs as in this 1506 painting by Cranch at the National Gallery in London (Figure 25). As a well educated and learned Benedictine nun, her attribute is a book with eyeballs to signify her restored sight.

Figure 24. *Scene in the Life of St. Mary and Ursula* and detail of St. Ottilia with two reading stones on a book.





Figure 25. Saints Christina and Ottilia detail with eyeballs



Single Lens Reading Glasses

Pragmatically, stone readers were not very ideal for writing because they had to be placed on the text to enlarge it; and for the most part, were so strong (often 10-40 diopters) that they were of limited help to those suffering from poor vision (i.e., presbyopia, hyperopia and myopia).

However, from the ancient world, we have archeological evidence that man

Dioptric Correction vs. Magnification

A diopter (D) is a metric measure of the refractive power of a lens. People with myopia use concave lens with negative diopter values (generally -1.25 to -3.00 D), while those with hyperopia use convex lens with positive values (+1.25 to +3.0 D) to correct refractive errors and make letters more readable.

On the other hand, a good magnifying lens works on a different optical principle, being only convex and much stronger, generally with a diopter measure of +10 or more. Magnifiers bend the light to make things *appear* closer and larger. For the most part, reading stones were in the range of +10 to +40 D.

A *dioptrical corrective lens* (Willach, 2008) functions like spectacles and is held close to the eye to correct the wrong focal length of the eye lens, while magnifying lens held closer to the text just enlarges the actual dimensions of the text. Allowing for artistic license, the position of the lens to the eye relative to the text in art images allow educated guesses as to what type of vision aid the tool might be.

Side Bar 2

discovered how to improve the optical quality of these crude powerful quartz stones by making them thinner, weaker and slightly convex, suitable for magnification or dioptrical correction (see *Side Bar 2*). Willach hypothesized (2008) that through the Middle Ages, the ancient art of stone grinding and polishing technology continued to be refined but, for the most part, only in monastery workshops.

These thinly honed rock-crystals (and later glass) discs became seen as precious objects and used for secular and religious ornamentation. As early as the 8th century CE, lenslike transparent objects were used to decorate liturgical art objects (like crosses, manuscript book covers, etc.) and for protective coverings of sacred relics of various saints or martyrs (i.e., holy cross splinters, bones, etc. from the crusades) in what were called *plate-reliquaries*. Figure 26 shows one such example, a wooden German Table Reliquary (1220-1225) with 12 windows displaying various labeled relics. Making a replica of the slightly convex rock-crystal disc of window #4 (Figure 26 detail), Willach (2008, pp. 21-25) effectively demonstrated that with this lens, text was quite clear and readable for a presbyopic eye of +4.2 diopter at a distance of 25 cm.



Figure 26. Table reliquary and detail of window # 4



Likely discovering that these clear, thin discs could improve sight during the grinding, polishing and finishing process of ornamentation or reliquary windows, some inventive monk or artisan shaped a wooden

frame and handle for the lens to be held in front of the eye for ease of reading and writing in the scriptoriums—effectively extending the literacy life of monastery scholars, manuscript

illuminators, scribes and copyists. Presto! We had our first single lens corrective reading aid. Amazingly, this stemmed monocular has gone in and out of fashion, but not out of use for the last 750 years!

The earliest known depiction of a single dioptrical vision aid (c. 1260) is on a sculpture of painted sandstone at the St. Maurice's in Konstanz (Constance), Germany (Figure 27) (World Lingo, 2011). On the interior of the 12 sided *Holy Sepulcher* representing the





Figure 27. Mauritus Rotunda, Konstanz, Germany

> Figure 28. Pharmacist holding single dioptrical lens or trowel? (c. 1260)

sacred grave of Christ, is a scene of three women buying ointment for embalming Jesus from a pharmacist who holds in his left hand a lens with a stem (Figure 28). The lens is only slightly curved and not highly convex, suggesting it is not a reading stone, but instead a reading lens held to the eye to correct the vision of the farsighted and aged. Some scholars believe this figure may be the Greek Hippocrates, the famous physician of Antiquity, pictured with his reading glass as "a symbol of wisdom and age" (Willach, 2008, p. 25). Others like Fleishman think it is actually a pharmacist's trowel (see Footnote ³)

In the very same amazing San Nicoló, Treviso fresco that included a representation of a magnifying mirror (Figure 16) by Tommaso da Modena in 1352, we find the *earliest extant painting of a single reading lens* on the southern wall. Aging Cardinal Nicholas of Rouen (Figure 29) holds a stemmed lens made of rock crystal close to his eye as he strains to see the page of a book. The position of the lens suggests that it is a corrective tool, not a magnifier.







Figure 30. Philosopher with single lens



The second oldest painting (Figure 30) of a single lens reading aid is another fresco by Andrea dei Bartoli (c. 1349-1369) a contemporary of Tommaso, in Cardinal Albornoz's Burial Chapel at Assisi (1367-69). In the lower left of a larger scene depicting St. Catherine debating the philosophers, two learned men consult an open book, one with a stemmed corrective lens (like Rouen) held close to his eye for either presbyopia or hyperopia issues.

Literates with myopia, on the other hand, had to wait almost 150 years before their sight could be improved with a concave lens. Nicholas of Cusa (1401-1464) a German theologian, philosopher

and scientist was the first to use concave lenses to correct nearsightedness in 1451. In one of his greatest masterpieces, Raphael (1483-1520) painted the first known portrait of a person using a single bi-concave lens to compensate for myopia in 1518.

Figure 31. Myopic Pope and detail of his concave single reading lens





Figure 31 depicts Pope Leo X of the Medici Family (1475-1521) known for severe myopia (-12 diopters) holding an elegant stemmed bi-concave lens as he studies an illuminated manuscript. Flanking, but not interacting with the Holy Father are two of his

Myopia Mystique

In the West, Hyman (2007) found myopia was only connected to a relatively small portion of our population (20-25 % of adults with eye problems). However amazingly, it seems to affect a very high percentage of creative people.

Many of our greatest poets and writers were nearsighted including Milton, Goethe, Keats, James Joyce and Edward Lear. Famous myopic musicians included Bach, Beethoven, Schubert and Wagner. Intriguingly, a number of our most revered painters were believed to be shortsighted: Blake, Degas, Cezanne and possibly Van Eyck, Durer, and Vermeer. (Macfarlane & Martin, 2002; Marmor & Ravin, 2009) cousins, Cardinals Luigi de' Rossi and Giulio de Medici. The famous portrait is rich in details, including a bell (symbolizing power) and the 14th century "*Hamilton Bible* (now at Berlin Staatliche Museum) open to the first verse of the Gospel of John: 'In the beginning there was the word'"(Beyer, 2003, p. 146). (See Sidebar 3 for more information on myopia.)

Later, Jacope da Empoli (1551-1641) captured the very same Pope in the act of actually reading with his single concave *lens* (Figure 32). As Michelangelo presents his model of San Lorenzo, the Pope holds the handled single concave lens in his left hand closer to his eye as he digests the distant material lying on the table

Figure 32. Pope Leo reading with his concave lens



Side Bar 3

(1617). (See *Side Bar 3* for more information on myopia.)

Quizzers

Although still with a handle, a distinctly different form of single lens achieved great popularity in the 1700s to mid-1800s. Called a *Quizzing Glass* or the more common name, *Quizzer*, this aid was particularly in vogue in Western Europe with both genders (Corson, 1967; Rosenthal, 1996). The name came from the practice of holding the glass

"up to the eye "to 'quiz' (stare, glance, look at quizzically) people and objects. "The wearer would sometimes glare at a person through his or her quizzing glass as a manner of set-down or mockery..." (Hern, 2004).

Quizzing glasses had long or short handles and were different from the monocular seen so far in that they were smaller, had loops at the end of the handle, and glass set in a thinner metal frame, although the earliest ones were made of wood. The glass was first in the form of plain small round lens but later manufactured in oval, oblong and square shapes. The loops were for holding by hand or attaching a chord to suspend the glass around the neck (Figure 33).





Figure 34. A quizzer caricature by I. R. and G. Cruikshank (1830)



Quizzing glasses were primarily a grand public fashion statement! Often highly ornamented, both women and men used them as jewelry or accessories. Foppish young men brandished them for effect, loving to posture, gesture and even caressing the quizzers—great fodder for caricatures of that time (Figure 34). The upshot of closing one eye as one looked through the lens held close to the socket was an air of snobbishness or hubris.

However, quizzing glasses also were taken seriously as an aid to reading. Most single lenses were convex simple magnifiers, although some were set with corrective lens (for hyperopia and presbyopia) for those who did not like to be seen with spectacles outside the home (Corson, 1967; Hern, 2004; Rosenthal, 1996). By their nature (i.e., hand-held), quizzing glasses were best adapted for *casual reading* as opposed to serious *extended reading;* however, some paintings suggest that wearers did read with them for protracted periods of times. The practice of wearing quizzers as a pendant around the neck allowed for handy access while reading or doing close work—a forerunner of the contemporary habit of hanging reading glasses on chains or chords. Some quizzers even had handles with swivel-mounts so that they could hang flat against the body when not in use.

That the quizzer was often the preferred vision aid is indicated by portraits of writers, artists and prominent men of the time sporting the little stemmed glass disks. Paintings attest to the role quizzers played as serious literary artifacts and also of their popularity or status among the educated or artistic communities.

For instance, French painter Theodore Rousseau (1812-1867) evidently must have considered a quizzing glass





draped like a watch across his stomach (1850) a suitable statement concerning his choice of a vision aid (Figure 35). Olinthus Gilbert Gregory (1774-1841) (English mathematician, Figure 36. *Olinthus Gilbert Gregory* with quizzer



teacher, author and editor) was painted in 1835 (Figure 36) with a quizzing glass, hanging prominently against his vest above the closed

book in his left hand—leaving little doubt that the visual aid played an important part in maintaining his scholarship at his advancing age of 61.



The women were not left out of the quizzing picture, so to speak, with several painted caricatures as well as portraits featuring the single lens in hand. Although meant as a fashion statement "A Lady in a Levantine Hat" (1797) actually seems to poke fun at both the quizzer and

the woman as a reader (Figure 37). Elegantly poised in her puffy hat with an open book in one hand and the little lens in the other, this young lady is strutting!

Single Lens Challenges

The single lens could not have been that easy to use in sustained and concentrated reading and writing. The challenges were many-fold:

- The hand holding the lens got tired and shook,
- Print wavered and jumped around,
- One eye had to be closed for better focus (a difficult feat for some people),
- The number of words taken in by the eye was limited and eyestrain common; and
- With one hand occupied, holding a page securely, writing or cradling a book while turning pages at the same time was difficult.

Side Bar 4

The most stunning and elegant painting I have

found of a quizzing glass is a portrait of Madame Marcotte de Sainte-Marie (1826), a

family friend of the painter Ingres (Figure 38). "Dressed to the nines" in brown satin and resting on a gold couch, Mrs. Marcotte has a very fancy chain around her neck attached to a lens that she delicately holds as she looks up from her reading.



Figure 38. *Madame Marcotte de Sainte-Marie* and detail of her quizzing glass



The Geography Lesson (before 1785) by Longhi is a particularly intriguing painting because of the different interpretations of the use of the quizzers that it garners (Figure 39). Is the instructor holding up the lens to stare or look quizzically at his young female student; is he actually showing his disapproval or setting her down for a wrong answer

Figure 39. Geography Lesson



(another common use of the lens in public); or, is he more interested in the beautiful student than deemed appropriate?

Monocles

Reading and writing with a stemmed monocular for any length of time was demanding (see *Side Bar 4*). In the 18th century, several new technologies ingeniously solved the challenges of holding a single lens to do close work. The evolution of the relatively rare *head monocles* and the wildly popular *eye rings* (the modern monocle) were a boon to literates in stabilizing the reading lens and freeing both hands.

One such contraption circling the forehead held a single lens suspended over one eye as in Figure 40.

Figure 40. Forehead single lens

Figure 41. Therbusch's Spina-Frontalis monocle



A woman artist (and an avid reader as well) became infamous for picturing herself wearing a leather or metal strap variation that wrapped over her head and secured under a headdress (Figure 41). Several self-portraits (including Figures 41-42) of Anna Dorethea Therbusch (1721-1783) shows the painter with an open book, as she looks up from reading—the large convex lens called a *spina-frontalis-monocle* hanging over her right





eye. Ilardi (2007) pointed out that "a myope using this contraption with a negative lens could have used the monocle for distance and the unaided eye for close work" (p. 299).

Therbusch (1721-1782) was an accomplished German painter of Polish decent and among other appointments, served as painter to the court of the Empress of Russia and to King Frederick II of Prussia. In all likelihood Therbusch (55 years old at the time) was suffering from presbyopia and used the lens for painting as well as reading and her other eye for distance. Her vision enhancement is analogues to today's *monovision* technique of one contact lens for near vision on one eye and, if needed, a lens for distance vision on the other eye.

First called an *Eye Ring*, the monocle was by far the most popular uniocular vision instrument to develop.

Thought to have evolved from quizzers (Davidson & MacGregor, 2002), the glass stem was shortened to a simple loop of metal around a circular lens. By considerably reducing the weight, the practiced user could grip the lens "by squeezing the orbicularis muscle" (Holtmann, 1980, p. xv).

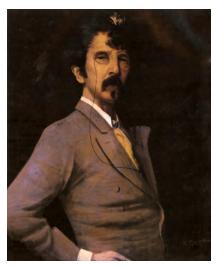
The original modern monocle surfaced around 1720s, when German Baron Philip Von Stosch (1691-1757) first introduced the single lens with a string, primarily "for near vision (like reading) and to balance the weaker eye with the good one" (Holtmann, 1980, p. xv). However, the golden era of monocle use (as well as artist's rendering of them) did not occur until the 1880s through the early 1900s. Monocles were commonly used as status symbols and fashion statements by privileged males (Fleishman, 2011). Often made fun of and derided for their foolishness and possible detrimental effect to one's vision, monocles were usually round, but were manufactured in a profusion of other shapes (rectangle, oval, square) with various metals for the frames. Square monocles held in the eye may have been even more fashionable in Paris in mid 1800s than round ones (see Corson, 1967, p. 118-119), as seen in this 1857 caricature (Figure 43) by Claude Monet (1840-1926).

When they were not mere window glass for fashion effect, the aid functioned as an effective dioptrical lens. The wearer may have carried two monocles, one for distance and the other for reading (Rosenthal, 1996). Advances in optometry allowed Figure 43. Young man with a square monocle



better measurement of refractive error in the early 1900s so that monocles could actually be prescribed individually with different strengths—thus becoming a better corrective device.





Paintings of monocle wearers underscore their popularity, particularly in England and Germany, both a hotbed of foppish and serious wearers. Well known artists, politicians, and poets of the time (as in Figures 44-47) were often seen be-monocled.

The corrective aid worn by the English painter James McNeill Whistler (1834-1903) is a prominent feature of several portraits done of him (Figure 44). The glass is as much a part of Whistler as his thick

horseshoe mustache. Like Anna Therbusch, as a consummate user of monocles, he probably donned the lens for close painting as well as reading. This is a man with attitude!

The numerous paintings of English politician Joseph Chamberlain (1836-1914) with monocle and surrounded by books and papers made a clear testimony about his intellectual life and preference for reading aids. Figure 45 is one such portrait by Sargent done in 1896.

Figure 45. Chamberlain in his study



Figure 46. Myopic Tennyson at Cambridge



Like some of our greatest poets, Tennyson (1809-1892) was myopic as confirmed in an early pencil drawing by his friend James Spedding (1808-1881) when they were together at Cambridge in 1831 (Figure 46). Sir Alfred Lord Tennyson, Poet Laureate, is the second most frequently quoted writer in The Oxford Dictionary of Quotations after Shakespeare. While no painted portraits exist showing Tennyson with a vision aid, several photographs indicate

Figure 47. Tennyson reading with a monocle



that he was a serious user of the modern monocle-

probably to correct his near-sightedness (Figure 47).

As for a German example, Karl Marx (1818-1883) could not be more appropriate. In numerous photographs, prints, and paintings, his monocle is ubiquitous hanging prominently against his chest. Basically tainted with their German association, monocles fell into disrepute, particularly after WWI and WWII. Paintings that depicted the monocle as a symbol of German authority, contempt for humankind and domination associated with the Nazi war machine are seen in Figures 49 and 50.





Figure 49. WWI German monocle



Figure 50. WWII German monocle



The Mighty Magnifier

In one of the earliest of Edgar Degas's (1834-1917) many café scenes, two men are seated at a table, examining what appears to be a newspaper; the man on the right holds a magnifying glass half way between his eye and the paper and his companion wears a monocle. *Café Charteaudun* (1869) leads us to conclude that monocles and simple magnifying glasses were still in fashion and used concurrently for reading by well-off, over-40 males at the mid-to-late 19th century France (Figure 51).

Interestingly, of all the monocular vision aids, the most enduring (spanning the centuries from antiquity to contemporary times) has been the *mighty magnifier* (see Footnote ⁴). Of course, the oldest vision aids were the first simple magnifiers, reading stones. Their Figure 51. At the Café Châteaudun



descendants, the "utilitarian (magnifying) reading glasses with handles have been used with astonishingly little change since the 13th century" (Corson, 1967, p. 81) (see Footnote ⁵). Two variations of the simple magnifiers are worth noting because of their appearance in paintings and their practical use in enlarging text, even today.

Pocket Magnifiers. Since straight handled magnifiers were too unwieldy to be portable, one transformation since the 13th century was the development of small round compact *pocket magnifier*. By the 1600s, small magnifiers were treated as valuable items, so much so they had cases to keep them safe and unscratched. By the end of the 18th century, the lenses were made to rotate in and out of attached protective cases (Davidson & MacGregor, 2002), making this compact mobile aid quite handy and gave ready access to magnification needs. Today the folding pocket magnifiers are still very much in demand coming in similar shapes and sizes, some even with illumination.



Figure 52. The Abbot Thomas Valperga with his pocket magnifier and case



In Figure 52 and detail, see how the "simple magnifier (obviously meant for reading) rotates into a decorative metal case that is likely to be silver" (Fleishman, 2011). This 1802 elegant portrait is of Abbot Thomas Valperga of Caluso (1737-1815) by Francois Fabre (1766-1837).

Six Inch Reading Glass. At the other end of the spectrum, perhaps the mother of all personal monocular magnifying aids was the Reading Glass. Also referred to as a

gallery or a library glass, the distinct optical form was popular during the 1700s to late 1800s and like the pocket magnifier, is still used today. While smaller, earlier magnifiers had shorter focal lengths, the reading glass

Figure 54. Close Scrutiny by Klausner



was a convex lens of a large diameter (usually about 6 inches), a long

focal length of more than ten inches and modest power, designed to be held a few inches from the text. Importantly, these reading glasses allowed use of not one but both of the reader's eyes to see the words, essentially solving a problem of much smaller magnifiers.

In a still life painting detail (Figure 53), Charles Spencelayh (1865-1958) captures the essence of the reading glass as it rests on an open tome ready to be put to work in deciphering the mysteries of the book. Suggestive of what it means to be a consummate reader, the work is entitled Fingerprints.

The end of the 19th century brought wonderful

examples of narrative paintings with the reading glass in use, particularly by aging male scholars. This gray-haired cardinal surrounded by his scattered books and scholarly accruements, leans intently over a document with his large reading glass in this work (Figure 54) entitled Close Scrutiny by R. Klausner.

As with monocles and magnifiers (see Figure 51), other paintings of the late 1800s showed readers preferring several different viewing options when print clearly presented a challenge. Van Gogh's doctor, Paul Gachet (1829-1909) is pictured in Figure 55 with a large reading glass beside a book upon which rests some dark rimmed spectacles. The artifacts in the portrait conjure up a picture of a learned, aged, educated man with poor eyesight who seriously loved to read, even the fine print!

One of my favorite depictions of two vision aids is in a 1927 painting by Norman Rockwell (1894-1978). A gentleman, somewhat advanced in years, wants so badly to read the tiny, blurred text that he enlists a large reading glass and his spectacles *simultaneously*

Figure 55. Dr. Paul Gachet with his spectacles and reading glass



Figure 53. *Fingerprints by* Spencelayh

Click here to view image at Russell-Cotes Art Gallery

to get the gist. Entitled *A Book of Romance*, the picture is sad and funny at the same time with the very proper old man, donned with a top hat, finding love vicariously through books while young love blooms in the next room. Note how Rockwell makes the room so thick with literacy that shelves, desk, chairs and floor overflow with reading material.

Figure 56.	<i>Book of Romance</i> by Norman Rockwell	

<u>Click here</u> <u>for image of Figure 56</u> at Norman Rockwell Museum In sum, the single lens has been an extraordinarily resilient vision aid, supporting literacy for more than 750 years. Until spectacles took off, they were the primary vision tool for reading and writing—and then held their own as a viable alternative to improving the poor vision of text. Monocular technology, as well as the plural

modern nomenclature (*a pair of glasses* or *spectacles* to mean *one* vision tool with *two lenses*), give hints as to the next step in the extraordinarily protracted development of eyewear. Now on to the intriguing story of what, in the service of literacy, may be the most important invention in the last 2000 years.

Double Lens Eyeglasses

While single lens technology was important to better vision (of text and otherwise), double lens eyeglasses were—from their inception—*all about literacy*!

Three quotes nicely illustrated the staggering importance of spectacles for readers and writers:

Spectacles have effectively doubled the active life of everyone who reads...preventing the world being ruled by people under 40. (Attributed to Nicholas Humphrey as cited in Ilardi, 2007, p. 3).

To men who were literate but were condemned to blurry vision never again to read, such a device must have seemed an unbelievable reprieve, a gift from God.... To no one, evidently, did it occur that [spectacles would]...help shape the course of history! (Corson, 1967, p. 9)

The art of making a pair of spectacles was an achievement of monumental significance for mankind that has had an incalculable impact. Although it has been relatively unknown to the general public, the evolution and development of spectacles over the past seven centuries qualifies as a long, significant, and quite fascinating journey through history, whose impact deserves to be better recognized and more widely appreciated. (Spencer Discala in Fleishman, 2011a) The invention of eyeglasses is a real historical "who done it." As Vasco Ronchi so aptly put it, "the world has found lenses on its nose without knowing whom to thank" (as cited in Rosen, 1956, p. 13).

With misconceptions and questionable verisimilitude, historians have proposed various hypotheses as to how and when spectacles actually came to be (see Corson (1967); Fleishman (2011); Ilardi (2007); Holtmann (1980); Rosen (1956); Rosenthal (1996); and Willach (2008). Although the true account is shrouded in historical mire, academics do seem to agree on five major points:

- We have the Italians to thank for the invention of reading spectacles around 1285, probably in Florence, Pisa or Venice. Fleishman (2011a) argues that the evidence comes down on the side of Pisa as the first place a primitive form of eyeglasses appeared, but Willach (2008) contends it is Venice because the first extant written evidence of spectacle development is a set of Venetian crystal-glass craftsmen's regulations in 1300 and 1301 linking glass lens directly with literacy manufacturing both "round disks for the eyes...and reading stones" and specifically "glasses for the eyes for reading" (pp. 35-36).
- 2. We also have the Roman Catholic Church to thank for spectacles' evolution and distribution. We can only guess how big a role lay artisan glassblowers and gem-smiths played in the actual inception of spectacles. However, if not directly created by monks, the innovation was certainly associated with industrious clerics who made significant contributions to the theory, development and dissemination of spectacles. "Had it not been for missionaries, man might have waited several hundred more years for this marvelous invention...." (Muth, c. 1995, as cited in Fleishman, 2011b).
- 3. *Thus, monasteries were the place to be* if you had an eye problem. Whether monks with poor eyesight were the impetus for spectacles' development, the actual inventors or just the lucky recipients of the technology, clerics with presbyopia and/or hyperopia (particularly writers, illuminists, copyists, and scholars in monastic scriptoriums) were the ones who significantly benefited.
- 4. Clearly optical theory lagged behind actual practice. As Ilardi (2007) concluded, "the invention did not result from the application of sound theoretical principles" (p. 28, Footnote 72). Skilled artisan monks used grinding and polishing techniques known in antiquity, well before theorists like Franciscan Bishop of Lincoln, Robert Grosseteste (c. 1175-1253) and friar Roger Bacon (1214-1294) first set forth a rationale and practical application of optics, vision correction and magnification. They attempted to explain (albeit, incorrectly) why simple magnifiers like reading stones and water filled globes worked to help people read and write (see *De Iride* by Grosseteste, 1220-1235, and *Opus Major* by Bacon, 1268). Accurate modern optical theory did not begin until Johannes Kepler's work in the 17th century.

5. And finally, with precious little early archeological evidence and few written documents, art works —particularly paintings—have been critical in the identification and dating of vision aids. Eminent optical scholars like Fleishman (2011); Ilardi (2007); Poulet (1980); and Rosenthal (1996) have followed the lead of ophthalmologist Richard

Greeff and colleagues (1929) in the extensive cataloguing of hundreds of public and private works of art that began associating spectacles anachronistically with famous Catholic saints and *Old and New Testament* figures in the 1300s. For, as Greeff, et al. (p. 189) said:

If we want to occupy ourselves with the history of the (sic.) spectacles, we cannot do without the works on representative art. (as cited in Ilardi, 2007, p. 261)

Another issue on which historians agree is that for over 700 years multiple problems have plagued the design of spectacles, including difficulties in making dioptric lenses for a wide range of vision problems and efficacious frames to hold the lenses. Contemporary optical specialists are still trying to find an efficient solution for maneuvering between the three "reading" distances of close, far, and mid-range vision (see Footnote⁶). Construction of frames has been a particularly hard and protracted problem historically because of the awkward nature of fitting glasses to the head. Innovations to keep the glasses attached and stabilized on the face and in the correct position in front of the eyes to read took hundreds of years to evolve. "Spectacles frames have been one of technology's best examples of poor engineering" (Drewey, 2007).

In a nutshell, the evolution of double lens frame technology goes like this:

- 1. On the *nose*,
- 2. On the *temple*, and
- 3. Over the ears!

Nose-Fitting Spectacles

The most fascinating of all the spectacles is the first one ever invented—the *rivet*. Some pioneering monk or craftsman thought to rivet together two hand-held crude single lenses incased in wooden frames with handles turned upside-down to form an inverted V. The earliest evidence we have of rivet spectacles are in paintings of Dominican monks by Italian artists just north of Venice in the mid 1300s.

Rivet Spectacles

Rivet nail eyeglasses (made to perch on noses) were in continuous use for approximately 300 years from 1285-1550, an extraordinarily long time. The original frames were made of wood and bone.

Figure 57. Nuns' Choir at Wienhausen Abbey, Germany



Ironically, the world's oldest surviving pairs of eyeglasses were not found in Italy, but instead in Germany. In fact archeologically, almost all of the extant pairs unearthed so far are from Northern Europe and only one bone pair has been found in Italy, home of the spectacle (Fleishman, 2011c) (see Footnote⁷).

The earliest riveted spectacles (c. 1330) that we have to date were found 160 miles south of Hamburg in 1953. Renovators found a cache of optics beneath the flooring of a seating area reserved for nuns attending mass (called a *nuns' choir*) at Wienhausen Abbey Convent, Germany (Figure 57). Among an array of 1000 objects (including glass cases, spectacle fragments and four later-dated leather spectacles) were several intact pairs of rivets representing three distinct types. To say the least, this was a stroke of luck for the history of spectacles (Figure 58)! Made of wood and thin glass plano-convex lens of +3 to +3.9 D, the rivet spectacles were probably discarded in a 1310-1330 renovation. (College of Optometrists, 2011; Fleishman, 2011c; Willach, 2008).

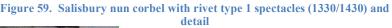
From left to right in Figure 58, Rivet type 1 had a straight stem; type 2, a curved stem; and type 3, more of a flatter bridge with lens between two layers. Type 1 and 2 had threads to tie the frame together whereas type 3 used 2 pieces of wood glued together (see Fleishman, 2011b for a detailed description of each design).

Figure 58. Three Designs of Rivet Spectacles: Type 1, Type 2 and Type 3



Amazingly, the first extant depiction of a woman wearing glasses and possibly the earliest figurative representation of any type of spectacles is at the Church of St. Martin, Salisbury, England. While the date is controversial, it could be as early as 1330 or as late as 1430-40 (College of Optometrists, 2011; Fleishman, 2011c). On an ornamented corbel (a piece of stone jutting out of a wall to give some kind of architectural support popular in early medieval buildings) is a nun wearing rivet 1 type spectacles. The artist even simulated her pupils in the middle of the lenses (Figure 59).







The long shafts of the stems brought the rivet juncture far above the nose bridge and between the nun's eyebrows resulting in the lens resting directly over her eyes. However, because they are not anchored to the face, it is doubtful the Salisbury sister kept the spectacles on her head for very long when she bent over to read (see Footnote⁸)!

While a boon to the sight of aging erudite monks and possibly nuns (see Side Bar 5 and Footnote⁹), the way rivet types were constructed precluded the practice of reading and close work for extended periods of time. Stiff, rigid, heavy and very unsteady, rivets were difficult to keep on the face, although they were meant to rest independently on the nose to free the hands. As seen in the next section, artists have pictured an intriguing range of reading behaviors that spoke to these problems-including forefinger pinches, balancing acts, inverted and one-eved squints.

Forefinger Rivets. Inevitably negating the advantage of handsfree reading and writing, literates resorted to grasping the glasses by the thumb and forefinger and pressing them to the face. Figure 60 demonstrates the forehead press from the top and Figure 62, the frame grip from the side as a means of keeping a lens directly in front of each eye.

Bespectacled Women

I find it intriguing that the oldest archeological examples of rivet spectacles (Figure 58) and possibly the earliest figurative spectacle representation (Figure 59) were associated with *women in convents* during the High Middle Ages. Could this evidence, indeed, point to regular reading and writing with spectacles by aging nuns?

Clearly literacy, as well as spectacles, was a male prerogative in the Middle Ages. Written records give very little indication that medieval females availed themselves of glasses. The only mention of a woman using spectacles (that I could find) was St. Francesca Bussa (1384-1440) who is said to have "read devotional books with eyeglasses" (Ilardi, 2007, p. 170).

However, other documents suggest that literacy was more widespread in medieval nunneries than initially thought. A number of sources starting from late antiquity describe convents (often founded by literate aristocratic women) as restricted communities for female refuge, study, and education. Theses sisters followed similar reading rules as their monastic brethren. Female orders such as the Dominicans were reported to be almost all literate. Particularly noteworthy in Germany from the 11th and 12th centuries, were a group of erudite abbesses who were authors, scribes and manuscript illuminators (Avrin, 1991; Fischer, 2003; Kellsey, 1999). Would not aging female writers have the same vision problems as their male counterparts?

Like written sources, art, for the most part is silent as to nuns' use of spectacles, until into the Renaissance. Not one woman saint has been painted actually wearing glasses, even the two Patron Saints of Poor Eyesight, Ottilia and St Lucy. In an authoritative survey by Poulet (1980), only 9 % of artistic works representing eyeglasses through 1850 are associated with women. Not until the mid-1600s did painters begin depicting bespectacled females reading—Lievens and Rembrandt being two of the first artists to do so in the 1620s (see Figures 80 and 81).

Side Bar 5

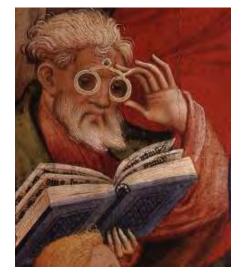
Figure 60. Zebedee with rivet 1 type spectacles



In *Relatives of St Anne* (end of 15th century) Zebedee (Figure 60), the father of disciples James and John, holds the joint of a rivet 1 type by his thumb and forefingers up by his cap —a quite taxing position to sustain. The dioptrical lenses are positioned in front of his eyes for better

Figure 61. *Glasses Apostle* with rivet type 3 spectacles

vision of the sheet of writing he is perusing. On the other hand, Figure 61 shows the gray-haired *Glasses Apostle* (probably St. Luke) in a 1403 German altarpiece grasping a pair of rivet type 3 on the side instead of the top, as he reads his book. Note that in both pictures and many examples to come, Biblical characters are depicted with spectacles hundreds of years before they were actually invented. Indeed, "Anachronism... [has been] the most frequent and pervasive elements in artistic representations of eyeglasses...." (Ilardi, 2007, p. 262) in manuscripts, altarpieces, frescos, canvases and panels.



Nose-Placed Rivets. By far the most common literacy practice was balancing the heavy rivets on the bony bridge or lower fleshy parts of the nostrils while tilting the head downward to read or write. Of the paintings that I have found pairing rivet spectacles with literacy activities, 77% (78/101) of represented glasses were situated independently on the nose in this manner.

The most famous painting of this reading behavior is of Cardinal Hugh de Saint Cher (Figure 62) in the 1352 Tommaso fresco at the San Nicoló Monastery. Across the room from St. Isnardo and his magnifying mirror (Figure 16), St. Cher's image reading in his cell with spectacles (Figure 62 and detail) is most remarkable for a number of reasons: it (a) represents the earliest painting of the first spectacles that we have; (b) suggests that in the mid-1300s, scholars, indeed, had a choice of 3 different types of vision aids (single lens, mirrors and double lens); (c) implies that within the culture, painters saw spectacles as important symbols of scholarship and learning; and consequently (d) sparks the beginning of *anachronistically* depicting scholars or saints with eyeglasses. Cardinal Hugh de Saint Cher could not have used spectacles because he died 22 years before glasses were invented!



Figure 62. *Cardinal Hugh de Saint Cher* writing in his cell and spectacle detail (the earliest painting of reading glasses).



Figure 63. Dr. Vincent Ilardi wearing rivet type 1 spectacles



One consequence of resting the hinge on the top of the nose is that the readers have to direct their gaze downward considerably because the lens are at the level of the cheeks. Figure 63 shows antique spectacle historian, Professor Vincent Ilardi (1925-2009) wearing a replica of type 1 rivet glasses in much the same manner as Hugh did some 700 years earlier.

Inverted Rivets. An illumination from an Italian choir book at the Convento di San Marco in Florence (mid 14th century about the same time as Hugh's portrait in 1352), illustrates another interesting early rivet use, as well the common medieval textual practice (Figure 64) of group *shared reading*. A choir of tonsured monks is chanting from a large book on a slanted lectern. One grasps a double lens with a rivet from *below* like a scissors instead of from the top—an arm position much easier to sustain than Zebedee's in Figure 60.

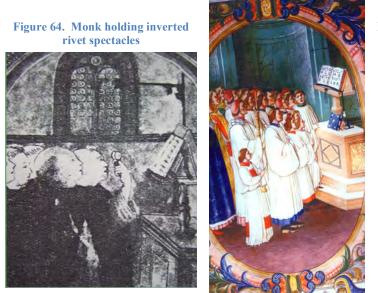


Figure 65. Shared reading and detail of a singer with rivet spectacles



The image of the monks in Figure 64 also speaks to the issue of *text size* as an important consideration for aging monks participating in and/or conducting public religious services (see *Side Bar 6*). Typical of religious choirs of this time period, a large group of members shared one extra-sized manuscript positioned on a lectern (seen also in Figure 65). The parchment was "thick and strong enough to withstand leaning against a slanted support and being held with sash weights on a daily basis" (Boehm, 1994, p. 20). In Figure 65 and detail, a 15th century Italian miniature by Strozzi, a tall man on the far top left is wearing rivet spectacles, probably with concave lenses to help him read the extra large choral script at a distance.

Monocular Rivets. In several examples, painters portrayed older men engaged in the curious practice of using only one rivet lens instead of two. Figures 66 and 67 depict each reader humorously clutching the left spectacle lens to his face, ostensibly using the right side as a single lens. The first (Figure 66) is a detail from an earlier painting picturing a philosopher using a single lens (Figure 30). To the right there is second scholar with rivet spectacles and head bent reading with only one eye. This 1367 fresco by Italian Andrea dei Bartoli depicts the 4th century event of 50 philosophers confronting St. Catherine of Alexandria in an attempt to undermine her faith.

The Bigger the Better!

We can only guess at what the influence of poor sight had on the production of gigantic handmade manuscripts with enlarged script of the Late Medieval and early Renaissance. Illuminated Bibles and service books are replete with miniatures showing clerics reading and chanting out of tomes propped up on large lecterns, particularly in scenes celebrating the Vespers of the Dead and other daily offices. In these large shared reading events, groups of monks gathered round a single giant choir book (either a Gradual or Antiphonary) written in super-sized script and musical notation so everyone could see. DeHamel (1986) suggested that for individual reading of the liturgy, Missals (rarely illuminated) were often written in larger script so that priests could read the Mass at greater distances from the altar.

Side Bar 6

Catherine is often referred to as the Patron Saint of Learning and Education. Like the Tommaso fresco images (Figures 29 and 62), the image confirms that single and double lenses were used concurrently for reading during this formative period.



Figure 66. Philosophers using single and

Figure 67. Reading with one eye at St. Martin's deathbed

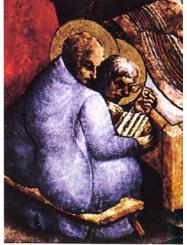


Figure 67 shows a graying man with (white bone?) rivet type 1 design in exactly the same posture as the philosopher. The scene executed around 1480, is of several men gathered at the deathbed of Saint Martin of Tours (c. 315-397), founder of the first monasteries in France. Scenes of death like this form a considerable body of religious imagery in Christian art, as the next examples illustrate.

In Figure 68, dated 1370-1372, an elderly disciple (in the lower left) is using his left eye to look through the right lens of a rivet spectacle. Here, the two apostles are reading scripture in a depiction of the death of Mary on an altarpiece at Innsbruck, Austria. Unique about this last work is that the painting is (a) the oldest surviving triptych wooden altar in the Alpine area, (b) the earliest extant representation of eyeglasses in the German speaking area (Daxecker, 1997), and (c) the first in a long line of narrative paintings of Mary's deathbed scene with one or more attending apostles using a vision aid.

Figure 68. *Death of Mary* and detail of one-eyed reading (1370-72)





Known as the *Death* or *Dormition of the Virgin*, the popular religious genre was inspired, seemingly by the story from the *Golden Legend* (see Footnote¹⁰) of 12 male apostles assembling from all over the world (and beyond the grave) to embrace and comfort the Virgin in her last hours (Thomas, 1994) (see Footnote¹¹). Usually a few disconsolate, aging disciples are shown consulting the scriptures. "The implication seems to be that even the wisest among scholars do not posses sufficient wisdom to heal the Virgin and change her destiny" (Manguel, 1996, p. 295).

The Death of the Virgin paintings are unique to the history of spectacles in that no other narrative thematic group has the distinction of so many works referencing the use of rivet spectacles. Symbolizing gravitas and intellectualism, bespectacled Apostles appear in at least 21 paintings of Mary's death from 1370-1510! A wonderful resource of rivet images, this thematic group of paintings brings to life three other unique early reading practices associated with spectacles: *magnified, tinted, and shared reading*.

Magnifier Rivets. Several Dormition artistic works (see Footnote ¹²) picture readers using spectacle lens as simple magnifiers (as opposed to dioptric corrective lenses) by laying one directly on the words like a reading stone. In *Death of Mary* (c. 1510) attributed to the Workshop of Hans and Jacob Strueb (Figure 69), young-looking Bartholomew is flanked by an older man who holds a rivet glass cases in his left hand and rivet type 1 spectacle in his right, using the left lens to enlarge the letters. Conceivably, readers may have closed the rivet spectacles to

Figure 69. An aging apostle using glasses as magnifiers



the

form a single lens magnifier of approximately double strength (Ilardi, 2007), but I can find no image of that practice.

Tinted Reading Rivets. Another early German painting of the *Death of Mary* (1418) is noteworthy for documenting what may be the earliest representation of tinted spectacle glass (see *Side Bar 7*). To the right of the outstretched Mary in Figure 70, a bearded disciple anchors his spectacles to his nose with his right thumb and forefinger. Wearing very dark lense in ivory rivet type 1 frames, he looks down with two other apostles to consult the scroll (see Figure 70 detail).

Shared Reading. The last three examples of the *Death of Mary* (Figures 68-70) together with the *Dormition of the Virgin* (Figure 71), nicely illustrate a common reading practice with handmade books prevalent throughout the Middle Ages and early Renaissance called *small group shared reading*. In Figure 71, Mary is attended by a bespeckled, aging erudite who shares a codex with two younger apostles. Figure 70. *Death of Mary* with detail of tinted glasses





Noteworthy is the type 2 rivet frame he holds that have threads that secure the tabs together to hold the lenses. The scene is full of angst with many furrowed brows and even an apostle pinching his nose in worry. According to Mangel (1996, p. 295), the glasses were not in the original anonymous Viennese painting executed in the 11th century. The spectacles were *added more than three centuries* later in 1437-1439 (see Footnote¹³).



Figure 71. Small group shared reading with detail of an apostle wearing type 2 rivet glasses



Whereas Figures 64 and 65 are illustrative of large group choral reading behavior typically performed orally with extremely rare and valuable extra large choral manuscripts such as *Graduals* or *Antiphonaries*, small group shared reading was generally executed with a more normal sized codices (probably also costly and precious) and usually entailed either oral or silent reading of two or three people. Clearly a defining literacy practice of the Middle Ages (before the printing press and wider access to books), small group shared reading is depicted in scores of manuscript illuminations starting late 12th century. Generally, groups of three (mostly males) were shown huddled around one text, either during church services or in educational related settings at monasteries and universities.

Handmade manuscripts were costly and time consuming to produce, consequently few in number. Universities under church leadership in the 14th century having limited original texts supplied one for every *three* students (Fischer, 2003). In addition to the restricted number of books, another reason for collective reading as in scenes like the *Death of Mary* may have been a pragmatic one. Clutching spectacles to one's face, holding the open book, turning the pages and deciphering the text all at the same time had to be a challenge—gratefully shared with others.

Tinted Tidbits

The first written reference of someone actually peering through a colored lens to aid vision was made by Pliny the Elder (23-79 CE) the famous Roman scholar in 77 CE. He described Nero using an emerald to better view a contest of gladiators. The oldest surviving reference to colored glass used in spectacles was in a 1459 Portuguese document (Ilardi, 2007, p. 127).

Significantly, however, early religious paintings and manuscript illuminations started picturing eyeglasses with varying degrees of color around 1380. Lenses ranged from a slight grayish color to almost black; light green to a heavier greenish tint; or various hues of blue or brown.

Why tinted glasses? The explanation has several facets:

- 1. The first lens materials were naturally colored. Pebble quartz or beryl was a sea green stone or aquamarine as well as a smoky gray color (Rosenthal, 1996, p. 38).
- 2. Various substances to tint glass would have been easy to add in the early manufacturing of spectacles (Ilardi, 2007, p. 127).
- 3. From the beginning, the tint was believed to have beneficial effects for weak and watery eyes. Green, in particular, was thought to be therapeutic and relaxing to the eyes.
- 4. The color offered protection from glare, "white paper reading, " dust, and smoke.
- 5. Today tinted eyeglasses and therapeutic specialty-tinted contact lenses are used for children who have reading problems and for prevention of headache in migraine sufferers.

The following are several interesting tidbits about colored glasses: In the 17th century tinted glasses were especially popular for helping poor vision. Samuel Pepys who had much trouble with his eyes, wrote in his diary in 1661 that he bought a pair of green spectacles that he found most efficacious and "managed to pore over handwritten official papers by candlelight the rough long winter evenings" (Davidson & MacGregor 2002, pp. 7-8).

In the 18th century, James Ayscough first started using tinted glasses of blue and green hue to help correct certain vision problems but it was not until Sam Grant introduced sunglasses in 1929 to protect eyes from the sun that our modern shades were born (Lipson, 2008).

Today the painting of John Lennon wearing his iconic retro-Windsor "English working" prescriptions glasses with trademark yellowish-orange tint by Andy Warhol (1995) is worth an estimated 2.5 million dollars!

Side Bar 7

Bow Spectacles

Art works featuring spectacles tell a story of significant advances in frame design and materials occurring from 1450-1500s when lenses were connected by an arched nosepiece that formed a single unit instead of two riveted pieces. Referred to as *bow*, *arch, rigid bridge or round bridge spectacles*, the glasses were commonly made of leather although other materials such as iron, wood or bone were sometimes used. With a "continuous solid curved single nose bridge," bows co-existed with the rivet types, gradually



Figure 72 and detail. Oldest surviving leather bow spectacles (c. 1520) and detail of slit bridge

superseding them by the mid-1500s (Fleishman, 2011b). Although they did tend to pinch the nose, leather (and later wire) round bridges were somewhat more flexible, lighter than wood or bone, and did not slide as easily off the nose. Some had ridges or 3-4 strips across the nosepiece (called *slit bridges*) that allowed for some spring to clasp the nose better—but these were rare.



Leather Framed. According to Dr. Fleishman, "leather frames had a relatively short life span from the 16th to the middle of the 18th century. Few have survived to the present day time and those are highly sought after" (2011a). The earliest extant (c. 1520) leather bow spectacles (six in total) were found in 1867 at Wartburg Castle (Figure 72 and detail), Nuremberg in the library of Willibald Pirckheimer (1460-1530). He was a close friend of both humanist Erasmus and painter Albrecht Durer who actually did several portraits of Pirckheimer.

A famous painting of Jan Van Eyck's (c. 1390-1441)) pictures one of the earliest representations of leather rigid bridge glasses (Figure 73 and detail) (see Footnote¹⁴). Indeed, *The Virgin and Child with Canon van der Paele* (1436) is remarkable for a number of reasons. The real-life donor Peale (the person who paid for the painting) kneels on the left, holding a service book wrapped in a book cloth protector as his hand is clutching the bridge of a pair of beautiful leather convex bow spectacles he has just removed. Thinking about what he has read, the Canon's features are grave and meditative, his aging form shown in striking realism with facial folds and balding scalp as he prays for entrance into heaven through Mary's intercession. "The inscription on the frame tells us that Van Eyck painted the panel at the behest of George van der Paele (1370-1443), a canon at the Church of St. Donatian in Bruges, to which the work was presented as the clergyman neared the end of his life" (De Rynck, 2004, p. 30).



Figure 73. *The Virgin with Canon van der Paele* and detail of leather fixed bridge



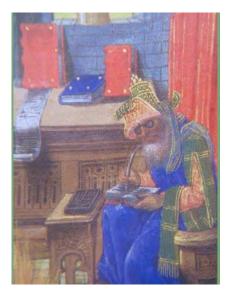
Based on the paintings of leather fixed bridge spectacles, the conventions for wearing them seem similar to rivet glasses: i.e., holding them on the side of the frame in front of

the eyes, pressing them to the nose, employing them as a single lens, or hanging them independently from the nose.

For instance, the bespeckled man with head tilted slightly in Figure 74 has his leather bows with dark tinted glass tucked securely on the bridge of his nose with both hands free for holding the quill and his codex. This unusual literacy scene is from the elaborately illustrated *Pembroke Hours*. In a room full of books and scrolls, the scribe, Ezra (Esdras), is shown rewriting the law apparently from memory after the Hebrew Scriptures were burned—as represented by the fire. The elaborate headdress identifies Ezra's status as an Old Testament priest of the Old Law (Leaves of Gold, 2011).

Figure 74. Ezra renewing the law and detail of him wearing leather-framed bow spectacles (1465)





In Figure 75, a nearsighted man, holds his leather-framed spectacles by the round bridge to his nose, tilting them forward to read the Christ's message on the ground in Mazzolino's *The Adulteress before Christ* (early 16th c). A unique example of a glass case to carry and protect the bows hangs from his belt.



Figure 75. Adulteress before Christ and detail of leather bows and glass case

Whereas the theme of *Mary's Death* personified rivets, that of *Jerome Reading (or writing)* epitomized rigid bridge spectacles. The next four paintings are illustrative of scores of examples associating Sophronius Eusebius Hieronymus viz., Jerome (340-420) with various types of bow spectacles and literacy events.



Figure 76. Example of a Van Cleve Jerome vanitas painting with detail of bow spectacles

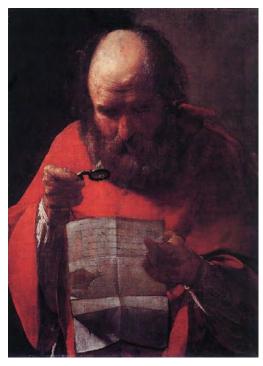


From 1510-1550, Dutch painter Van Cleve painted a series of renditions of Jerome in his study. The saint usually is pointing to a skull with bow spectacles lying close by on the

table as in Figure 76 *and detail* owned by the British Optical Museum, London. Jerome surrounded by his writing tools, is weary from composing and has momentarily laid his glasses down on the table. " The writing in the Bible is legible. The words, in Latin, appear to be those at the beginning of Psalm 51: 'Have mercy upon me, O God, according to Thy loving kindness'" (College of Optometrists, 2011a). The rest of the quote could well have read, *and you gave me glasses in my old age*!

Like rivets, readers must have used bow spectacles as monoculars, too. A striking 1621 painting by Georges de La Tour (1593-1652) shows Jerome holding leather rounded bridge glasses by the right lens and looking through the left lens (Figure 77). The spectacles are half way between his eyes and the letter he holds. Ostensibly Jerome is using the bow spectacles as a simple magnifier to enlarge the words—

Figure 77. St. Jerome Reading (1621)



(1652)

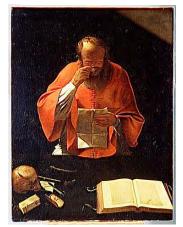


Figure 78. St. Jerome Reading much as the apostle does with the rivet type in Death of Mary (Figure 68) some 250 years earlier.

> In a later painting (1652) of the same name, La Tour pictures the Church Father holding his specs on the fleshy part of his nose (Figure 78) like the Mazzolino's myopic reader in Figure 75. At the bottom left, the artist includes a wooden case among the instruments and vanitas elements. This painting and the next are the last in a long line of Jerome portraits with spectacles that are in the vanitas-study genre. Prototypes began with the Tommaso image of Jerome surrounded by writing artifacts including the horned mirror (1352) and Colantonio's St. Jerome in his Study (1445) with its profusion of literary tools and the earliest

representation of Jerome with spectacles (Figures 18 and 19) (see Side Bar 8).

Nuremberg Wires. A new form of rigid bridge spectacle frame appeared in early

Figure 79. Jerome Reading and detail of Jerome reading with Nuremberg wire spectacles



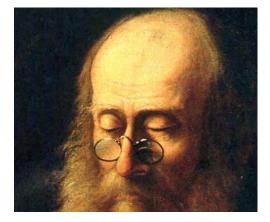
17th century Germany and is a prized item for antique spectacle collectors today. *Nuremberg* wires were comprised of a "single length of stiff wire usually copper which formed both the rim and the bridge" (Davidson & MacGregor, 2002, p. 6). Marketed to the masses all over Europe by the Germans, these spectacles may well have been the "Western world's first true industry" (Fleishman, 2011). Because Nurembergs were cheap and light, they could be worn with more ease further down on the nose as shown in this Jerome 1677 vanitas painting (Figure 79) by William van Drielenburg (1635-1687). With incredible detail and a touch of humor, the artist painted a crack in the left reading lens.

Incredibly, it was not until the 1620s that the first

paintings of bespeckled females actually reading began to appear-and Nurembergs were hanging on their noses. With the groundbreaking work of two contemporaries, Jan

Lievens (1607-1674) and Rembrandt Harmenszoon van Rijn (1606-1669) (see Footnote¹⁵), what a beginning it was!

As a child protégé, Jan Lievens painted an image of (possibly) his grandmother reading (Figure 80) when he was between 12-14 years of age (Gurewitsch, 2009). Richly dressed in an ermine fur wrap, she is intent in her book



with wire glasses resting securely up on the bridge of her nose.

On the other hand, Rembrandt at age 25 painted his mother (1629) Cornelia (d. 1640), supposedly dressed as Hannah with the wire glasses almost to the tip her nose (Figure 81) (see Footnote¹⁶). The exquisite lighting effects with the luminous tome and the aging, yet glowing face full of passionate reading of the word of God make this the obvious masterpiece of the two for any bibliophile.

Figure 80. Lievens' Old Woman Reading (1621-23)



Head and Cap Spectacles. In rare depictions, painters have given us a sense of another unique way to keep glasses on the nose, viz., attached to hats. First representations (Figure 82) were rivet frames held by headgear (1417); later (1768), wire bows dangled by chords from caps (Figure 83). Almost 500 years after the invention of spectacles, literates were still trying to stabilize lens in front of their eyes—seemingly never having considered the use of ears as an anchor!



Figure 82. Earliest representation of a

Figure 83. 18th century cap spectacles



Figure 81. Rembrandt's mother reading (1629)

Jerome, the Anachronism Icon!

The most painted of all Western Church Fathers is Sophronius Eusebius Hieronymus (340-420), known to us as Jerome. First appearing around the 10th century, early manuscript miniatures began venerating Jerome in typical author portraits that harks back to antiquity—writers composing at a slanted desk in an architectural setting using only pen, knife and book or scroll.

A book on Jerome by a Bologna University professor in the 1300s was largely the impetus for the popularity of a different image of Jerome as a scholar in a profusion of literacy paraphernalia (Meiss, 1970, p. 169). This superabundance of artifacts in a limited space was a persistent icon, repeated scores of times from the early Tommaso fresco in 1352 (Figure 18) through the late 17th century. Objects included (a) *literary artifacts* (rule, pen, red/black ink, inkhorn or portable pots, scissors, manuscripts, scrolls, writing desk or lecterns, and sometimes legible mottos or a Psalm quote), (b) *religious references* (rosary, beaker of red liquid, Bishop's hat, stone and lion); or (c) *vanitas elements* (hourglass with sands of time, skull, extinguished candle, and of course, *spectacles*.

There were several reasons for artists to pair spectacles with Jerome some 800 hundred years *after* he lived: glasses were symbols for (a) old age, bodily decay and inevitable death; (b) learning and wisdom; or (c) authorship demonstrating illuminated or sharpened sight, i.e., Jerome's clarification of the word of God through his Bible translation. After all, Jerome was the quintessential scholar of the Catholic Church.

Because there were so many anachronistic paintings of Jerome that included spectacles (approximately 60 at my last count), their invention is frequently attributed to Jerome. Particularly in the late Middle Ages and the Renaissance, this belief coupled with the fact that Jerome complained of vision difficulty in his later years, lead many to regard Jerome as the Patron Saint of Glassmakers and Spectacle Makers. He correctly was the Patron Saint of Librarians, Scholars and Translators and Writings because of his masterpiece, the *Latin Vulgate*.

Thus, while artists have aided our modern day historians in documenting the use and development of spectacles, they also contributed greatly to the historical confusion of their origins. Fashioned by artists' works, *Jerome became the anachronistic icon of spectacles!*

Side Bar 8

Thread Loop Spectacles. One exception was the Spanish who were way ahead of the curve and did use the ears to anchor *thread loop spectacles*. Documented around 1500, the Spanish put weights at the end of the cords that hung over the back of the ears (Fleishman, 2011a) to further secure the glasses. By 1600, thread loops were common with the elite and large prominent spectacles were status symbols as represented in one of El Greco's finest paintings (Figure 84).

Identified as Cardinal Don Fernando Niño de Guevera (1541-1609), the Grand Inquisitor and Archbishop of Seville is wearing bow spectacles with strings looped around the ears.

His finely wrought features framed by a manicured, graying beard and crimson biretta, the sitter is perched like some magnificent bird of prey in a gold-fringed chair, his dazzling watered-silk robes, *mozzetta* [elbow-length cap] and lace-

Figure 84. *The Portrait of a Cardinal* (c. 1600)



trimmed *rochet* [vestment] flaring out like exotic plumage. The round-rimmed glasses confer on his gaze a frightening, hawkish intensity as he examines the

viewer with an air of implacable, even cruel detachment, his right hand impatiently almost convulsively grasping the armrest. (Davies, 2003, p. 282)

Pince-nez (French for "pinching the nose")

Pince-nez glasses were the last iteration of nose spectacle design to evolve. Often called *nip nose* spectacles, they were much smaller and lighter than earlier bow glasses and clipped to the bridge of the nose with a spring, giving an old world look. They came in an array of shapes and kinds: folding, hinged, rigid bridge, C-bridge, spring bridge and rimless. With adjustments to better fit noses of all shapes and nose pads for comfort, they had a minimal feel, flattered the face and were quite practical for literacy endeavors.

First appearing in the 1840s, pince-nez were, in truth, the descendants of the bow spectacles and an archaic throwback to the nose spectacles of by-gone years. "At the peak of popularity from 1885 to 1919, pince-nez accounted for roughly sixty-seventy percent of all eyeglasses worn in the US " (Alan, 2008), worn particularly for reading until their eventual demise in 1930s (Rosenthal, 1996).

Nose squashers, as pince-nez were called, had a few failings, however. Their main problem was that they could not be worn comfortably for extended periods of time. With that in mind, they were designed for taking on and off frequently and had simple chords, ribbons or chains attached to small loops on the side of the frame. Unfortunately, the chords could drag down one side and distort the vision correction function (see Rosenthal, 1996, pp. 236-257). Furthermore, because lenses had to be quite close to the eyelids, sometimes the lashes had to be cut for comfort.

While both an upper and middle class phenomena, pince-nez spectacles were particularly embraced by the elite and professional writers, artists and politicians who could afford precise fits by opticians (Alan, 2010) as typified in the three portraits of Zola, Degas and Roosevelt below.

Figure 85. Zola in pincenez spectacles (1902)





Figure 86. *Portrait of Émile Zola* by Manet (1868) and detail of pince-nez



Underscoring their importance in his literary life, Émile Zola (1840-1902) novelist, playwright, and journalist had numerous photos taken of him wearing pince-nez and also one famous 1868 painting (Figures 85-86 and detail) executed by Edouard Manet (1832-1883). In the latter work, note the nip nose spectacles are attached to a chord around his neck, peeping out near the spine of the open book on the far bottom left of the detail.

Figure 87. *Edgar Degas* by Desbourtin (1875)



In an 1875 painting (Figure 87) by Marcellin Gilbert Desbourtin (1823-1902), Edgar Degas (1834-1917) reads the newspaper with adjustable and hinged nose nips—one of two pairs that he owned. Although the famous impressionist painter had only mild myopia and astigmatism and could read most print without glasses, he had chronic and progressive eye disease starting at thirtysix years of age. The neutral gray-tinted spectacles in the Desbourtin portrait were probably a form of treatment "which blocked out 85% of the incoming light" (Marmor & Ravin, 2009, p. 189). The retinal disease possibly drew Degas to create in pastels and sculpture and clearly affected the visual components of his work. As Marmor suggests, by midlife the paintings of Degas became

blurrier with "the shading lines and

details of the face, hair and clothing... progressively less refined" (White, 2007).

The 26th US President, Theodore Roosevelt (1858-1919) was quite attached to his pince-nez glasses owning multiple pairs. He was pictured numerous times with his C-bridge type pince-nez glasses as in Figure 88. They went far in creating the popular image of Teddy as a jaunty, intellectual and energetic president. A number of other US Presidents wore pince-nez including Woodrow Wilson, Calvin Coolidge and Franklin. D. Roosevelt.

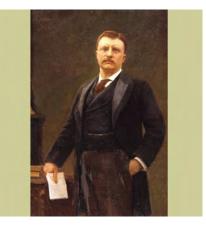


Figure 88. Theodore Roosevelt by

Becker-Gundahl (1925)

Temple-Fitting Pressure Spectacles with Rigid Sides

Obviously, nose spectacles did not solve the persistent problem of how to hold spectacles securely and comfortably on the face. FINALLY in the early 18th century after almost 450 years, an Englishman did find a solution! London Optician, Edward Scarlett is credited (although not confirmed) with the invention of the first rigid sides, adding them to bow or C-bridge frames with round lens. Unlike the modern spectacle frames though, this next innovative transformation did not rest on the ears, but instead was kept on by pressure above the ears on the temples.

Early Straight-Armed Temples

Figure 89 shows an example of the world's oldest form of glasses with sides, the *Scarlett temples*, first advertised between 1714 and 1727 (see Footnote¹⁷). Initially swirls (as in Figure 89) were added—then rings (Figure 90) to the ends of short stems (finials) to put the stress on the side of the head and help take it off the nose. Early models were made of iron or steel (Corson, 1967; Rosenthal, 1996) and Europeans called them *ringside spectacles* (Spectacles and Sunglasses, 2005).



"One facet of the use of temples quickly became evident, their concurrent use with the wearing of wigs" during the Rococo period, when they were popular in Europe and America (Rosenthal, 1996, p. 111). Consequently, early temples became known as *wig spectacles* with sides stopping on the temple before the wig. Later straight arms were lengthened with round and teardrop finials to more deeply penetrate wigs or hats (Figure 91) for a more comfortable fit. Paintings with representations of both the rigid Scarlett swirls and longer straight arms follow.

Figure 92. *Portrait of Daniel Nikolaus Chodowiecki*, German painter and printmaker



Sporting a pair of Scarlett-type spectacles, Daniel Chodowiecki (1726-1801) famous painter and one of the most popular German engravers and graphic artists of the 18th century, is taking a minute to rest his eyes from reading (Figure 92). One of only a few artists of his time who painted himself with spectacles, Anton Graff (1736-1813) the creator of Chodwiecki's portrait also portrayed himself wearing short-armed Scarlett Temples with the addition of a visor to stop the glare and bring out the colors.

An even more famous artist of the 18th century, Jean-Baptiste-Simeon Chardin (1699-1778) also painted himself in his old age (1771, 1775, 1779) with early temple glasses and an eye shade similar Graff's. In his first self-portrait (1771), Chardin wore Nuremburg-style wire round bows hanging at the end of his nose .

Several years later, he dawned longer rigid straight-armed temples probably with large round finials—proudly, almost arrogantly declaring his seventy-year-old self in need of spectacles for close work (Figure 94). Note the two different areas of the nose on which the glasses rest and how Chardin would have read and painted differently—looking down through the glasses clamped low on his nose or directly through the lenses.



Chardin's failing sight was, of course age-related, but also according to Boyer (2005) a result of a life-time of grinding pigments with lead base that mixed with oil burned his eyes. In the desire to keep painting through his later years, Chardin adjusted by taking up pastels that allowed for a more fuzzy medium, experimented with different types of glasses for better vision; and as in Figure 94 used an eyeshade to block out light and brighten the colors as he painted (see *Side Bar 9*). His headwear, relaxed costume of an artist at home, and large temple frames with stems are almost laughable yet at the same time "belied by the man's shrewd, concentrated gaze, and the firm set of his jaw and mouth" (Hustvedt, 2005, p. 41).

Following the early rigid temples (as worn by Chardin and Chodowiecki) numerous creative innovations in sided spectacles evolved. As we will see in the final section on lighting advances, the mid-to-late 1700s and early 1800s were a hotbed of technological advances— in this case of spectacle frames and lens design, notably three alternate types of extension-type rigid side arms and three new optical lens forms.

Extensions: Double-Hinged, Turn-Pin and Sliding Adjustable Temples

Three wrap-around temple models flourished from the mid-1750s into the 19th century. Historically, the *double-hinged* sided spectacle, invented by James Ayschough in 1752 was the first innovation (Figure 95). The second was the *turn-pin* temples produced in the later 1700s with swivels that rotated 360 degrees to fit the owner's crown as in Figure 96. The third was the *sliding temple (sliding or adjustable)* that like the turn-pin extended to fit past the temple and around the head, as in Figure 97. However, adjustables (popular in the early 19th century) had a retractable section that lengthened each of the stems and folded inward to clasp the head (see Footnote¹⁸).



Figure 96. Turn-pin temples



Figure 97. Sliding adjustable temples



A third famous artist of the 18th century painted himself with temple spectacles in his later years. Known for his wig spectacles with turn-pin sides (worn over his wig), Sir Joshua Reynolds (1723-1792) (Figure 98), as with Chardin, struggled to be a productive artist and scholar as he aged. In the mid-1780s, he described the sudden blindness in his left eye as "a curtain falling across his face" (College of Optometrist, 2011b). The strength of Reynolds' two pair of surviving spectacles indicated that he was very myopic (-4 to -4.75 D).

Figure 98. *Self-Portrait of Reynolds* and detail of Reynolds in wig turn-pins





Figure 99 pictures an actual pair of Reynolds' turn-pins with round lens, silver

White Wall Effect

Chardin, as well as other artists, found that an eyeshade made colors more distinct, and often wore one while painting. When viewing paintings at art museums, try this technique to counteract the glare of bad lighting and the *white wall effect*, which makes every painting on a light wall seem relatively dark. Cup your hands like a tunnel and look through it to the painting. Like Chardin, you will find the light infiltration will be less and the colors will be brighter (see Marmor & Ravin, 2009, p. 48).

Side Bar 9

frames and medium teardrop finials. They are accompanied by a shagreen eyeglass case, typically used with finer quality spectacles of the time (see Footnote¹⁹).

Patrick Henry (1736-1799) was known for his round doublehinged temple frames (Figure 100), but not resting on his nose. At least seven different paintings show his glasses

Figure 99. Turn-pin temple glasses and shagreen case belong to Sir Joshua Reynolds



with the hinges swung open to hold the glasses perched on his head—much like we wear reading glasses today atop our heads, ready for pull-down access (Figure 101).



Figure 101. Patrick Henry by Thomas Sully



Martin's Margins

A collector's item today and certainly one of the most unusual styles of temple spectacles was *Martin's Margins* worn by British society, in particular, until the early 19th century

Figure 102. Steel Martin's Margins (Visual Glasses)



(Figure 102). From the 1750s until his death, London optician Benjamin Martin (1704-1782) marketed his *visual glasses* with their inner ring of horn inserts designed to reduce the amount of light entering the eyes. His "medicine for the eyes" was bi-convex so the innovation was not available for myopic readers. For the most part ineffective, visual glasses were notable in that they are one of the first adaptations in which an optical innovation actually changed the very appearance of the frames. (See College of Optometrists, 2011c; Corson, 1967; Fleishman,

2011e; Rosenthal, 1996).

Defending his invention, Martin wrote in a 1756 pamphlet (Figure 103) An *Essay on Visual Glasses* (*Vulgarly called SPECTACLES*).... that

> Action of Light upon the Eye tends gradually to weaken it, the common Size of Spectacle-Glasses pours in upon the Eye-Ball three Times as much as is necessary for this Purpose; and therefore is very prejudicial to the Eye in this Respect, as in Time it makes them weak and watery.

(as cited in College of Optometrists, 2011c)

As for an aging reader and writer, Martin described the plight of the poor-sighted who no longer had a literate life:

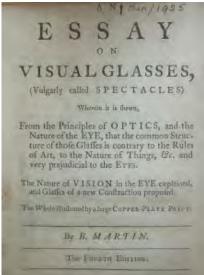
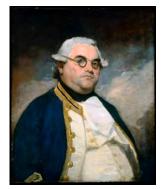


Figure 103. Pamphlet by Benjamin Martin

...How forlorn would the latter Part of most Men's lives prove, unless Spectacles were at hand to help their Eyes, and a Little Piece of Glass supplied the Decays of Nature? The curious Mechanic, engaged in any Minute Work, could no longer follow his trade than to the 50^{th} or 60^{th} Year of his Age. The Scholar could not

longer converse with his Books, or with an absent Friend in a Letter. All after that would be melancholy Idleness, or he must content himself to use another Man's Eyes for every Line. (as cited in Corson, 1967, p. 69).

Figure 104 is a rare example of portrait of a person wearing visual glasses. The sitter, Admiral Peter Rainier (1741-1808) was a British naval officer in whose honor Captain George Vancouver in 1792, named the great peak in Washington State "Mount Rainier." The Admiral obviously was proud of his Martins as he posed for several portraits in them. Figure 104. *Admiral Peter Rainier* in Visual Glasses



Four Lens Spectacles

A more important optical innovation than Visual Glasses was the *four lens spectacle*, because of their literacy versatility, viz., seeing close and distant print clearly. One set of lenses could be used alone for far-away reading or a second pair could combine with the first for better sight of print nearer at hand. As illustrated in Figures 105 and 106, two different designs were patented, the latter being more common:

In 1783, Optician Addison Smith obtained the first spectacle patent, # 1359, in London for two additional lenses hinged above the distance correction and capable of being rotated down for close work (making a total of four lenses). In 1797, English Optician John Richardson conceived the idea of different four lens spectacles where the two supplementary lenses, patent #2187, could be rotated in when doing close work. (Fleishman, 2011a)



Figure 105. Addison Smith four lens

Figure 106. Richardson-type four lens design with sliding adjustable sides and teardrop finials (1797)



As he looked out over the crowd at his first inauguration in 1829, Andrew Jackson (1767-1845), our 7th President, "wore two pairs of eye glasses: one currently on his eyes, and one—his reading lenses—thrown on top of his head" (Brands, 2005, p. 410). A few years later, Philip Hewins (1806-1850) painted him as solving the two-spectacle problem with four lens Richardson-type glasses. Often referred to as *side cups*, Jackson's reading lenses flipped back toward the ears as seen in Figure 107 detail.

Figure 107. Detail of Jackson's oval four lens spectacles



Bifocals

About the same time the English were experimenting with four lens technology for distance and close vision correction, Ben Franklin (1706-1790) (American author, inventor, politician and founding father), was putting his own mark on optical lens development; indeed, tinkering with a similar concept called *bifocals*, also called *double glasses or split lens*. (See *Side Bar 10* for these and other examples.)

Awesome Slide Shows

Want to see more examples of temple eyewear? Dr. David Fleishman has put together exhaustive slide shows of Benjamin Martin Spectacles, Temple Spectacles, and Four Lens and Ben Franklin Style Bifocals-and much more from various collections. Click the link below and use the pull down menu under Collections/Virtual Museum for a real antique treat! http://www.antiquespectacles.com/

Side Bar 10

Optometrists, 2011d), Fleishman (along with American eyeglass authority Alan McBrayer) argue persuasively that Franklin was, indeed, the Father of

the Bifocals (see 2011f and Footnote²⁰).

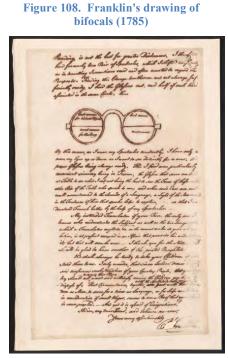
Among the evidence that Fleishman presents are numerous letters of Franklin's including two written to his friend, George Whatley, a London merchant and pamphleteer. In August 1784, Franklin (aet 78) complained that "he could not distinguish a letter even

of large print" without them his double spectacles (Franklin Papers, August 21, 1784).

In a second letter to Whatley, Franklin said of his "split lenses" that:

... The same convexity of glass, through which a man sees clearest and best at the Distance proper for Reading, is not the best for greater Distances. I therefore had

While the British Optical Association claim it is a matter of debate as to whether Ben Franklin invented the bifocal spectacle lens (College of



formerly two Pair of Spectacles, which I shifted occasionally, as in traveling I sometimes read, and often wanted to regard the Prospects. Finding this Change troublesome, and not always sufficiently ready, I had the Glasses cut and half of each kind associated in the same Circle, thus By this means, as I wear my Spectacles constantly, I have only to move my Eyes up or down, as I want to see distinctly far or near, the proper glasses being always ready. (Franklin Papers, May 23, 1785)

The letter included a now-famous drawing in Franklin's hand identifying the stronger lens "most convex for reading" at the bottom and weaker lens "least convex for distant objects" at the top (Figure 108).

Franklin (quite the image-maker) commissioned at least 11 paintings from 1766-1785 wearing his signature Cbridge temple rings (Figure 109)—in contrasting personas of politician, scholar and philosopher (see Footnote²¹). Although probably wearing convex glasses by his 30s-40s for mild hyperopia (Fleishman, 2011f), Ben was not painted with glasses until 1766 (aet 60) (Figure 110). In the French manner, he wore "the short Figure 109. Temple design worn by Franklin before bifocals



wig...favored by physicians and men of science," and sat in a classical contemplative reading pose (Chaplin, 2006. p. 193).

A decade later Ben Franklin posed for several French portraits with his iconic Canadian Martin fur cap—presenting a stark contrast to the classical look and to the powdered wigs of Paris where he lived at the time (Figure 111). Chaplin (2006) suggests that Franklin's intent was to present himself as a fur-capped French philosopher such as Jean-Jacques Rousseau or Newtonian theorist Pierre-Louis Moreau de Maupertius; while Isaacson (2003) says his taciturn expression and Quaker-like dress projected quiet simplicity with "homespun purity and New World virtue, just as his ever-present spectacles... became an emblem of wisdom" (p. 328).

Figure 110. Franklin posing as a classical scholar in the earliest painting of him wearing glasses (1766)



Figure 111. Franklin posing as a philosopher in a fur cap (1778)



Franklin probably began experimenting with bifocals in the 1760s and certainly was using them by the 1780s when Charles Willson Peale (1741-1827 portrayed him in Franklin's first portrait wearing "double glasses" (see Footnote²²). Remarkably, no earlier picture of bifocals exists (Figure 112 and detail). Following Franklin's lead, artist Peale began using bifocals himself to paint miniatures and Thomas Jefferson, impressed with Franklin's double glasses designed his own oval bifocals in 1808 (*Side Bar 11*).

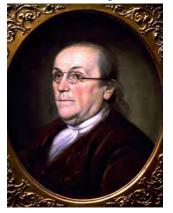


Figure 112. *Ben Franklin* with detail of the earliest image of bifocals



Jefferson's Spectacle Innovations

President Thomas Jefferson (1743-1826) wrote to John McAllister, Sr. (called America's first optician) acknowledging the convenience of the small reading glasses he had made for him, "so reduced in size as to give facility to the looking over their top without moving them" (November 12, 1806). He requested that McAllister make even smaller glasses for reading and some split lens spectacles like his friend Franklin had designed and earlier had recommended to him for reading and distance. Jefferson provided his own original sketch for the small <u>oval</u> reading frames (silver) with regular lens (as seen in Figure 113) as well as the strengths of the split lenses to be put in small <u>round</u> frames. Two weeks later, McAllister sent 6 pairs of regular glasses and 12 pairs of bifocal lenses from weak to strong—a common practice of that time so the wearer could adjust for the aging process over time with different lens choices (Thomas Jefferson Papers, 1806, December 1).

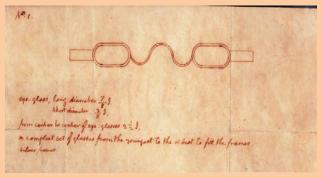


Figure 113. Detail of Jefferson letter to John McAllister (December, 1, 1806)

In a letter to McAllister two years later (1808), Jefferson stated that he was very pleased with the double glasses, but the round shaped bifocal lens turned and brought the seam in the way of the eye. Asking McAllister to solve the problem by putting the double glasses in the small oval frames of his 1806 sketch, Jefferson said that "Altho these glasses are very small and consequently the half glasses uncommonly so, I am not afraid but that they will present full space enough for reading and writing, etc...." (Thomas Jefferson Papers, 1808, November 16). Amazingly, Jefferson's idea of combining reading and intermediate vision focal lengths in so reduced frame size did not interfere with distance and essentially gave him the advantages of trifocals (Eyeglasses, 2011).

19th Century Glasses

Except for the invention of rimless glasses (1824) and the correction of astigmatism (1827)), the bulk of the 19th century brought few major technological advances in spectacle optics or frame construction (Corson, 1967). One example will suffice to give you a flavor of reading glass habits of that time.

Figure 115. Lincoln with short temples reading with Tad



Historical records,

paintings and artifacts of Abraham Lincoln (1809-1865) document some common literacy/spectacle practices of the later 19th century. Mildly farsighted, Lincoln needed eyeglasses to read in his forties. "His first spectacles, which he bought in 1856, in a tiny jewelry shop in Bloomington with the remark that he 'had got to be forty-seven years old and ... needed them' cost him 37 ½ cents" (Hapgood, 1900, p. 417). Historical accounts suggest that he used glasses to read major speeches, including his first inauguration and the Gettysburg address and that he seemed to take them on and off slowly and deliberately for stage effect as well as to actually see the text better. Experts also think that Abe had

multiple pairs of eyeglasses for different purposes: to read books, newspapers and letters depending on the size of print, light available, the aging process, etc. Indeed, Lincoln had two pairs of glasses (+2.00 and +1.75 D) on his person when he was assassinated in April 14, 1865 as shown in Figure 114 (see Footnote²³).

Most assuredly fit to Lincoln's specific needs, the spectacles at the top of the photo have oval lens, small teardrop finials and adjustable sides. The pair must have been repaired by the President himself —note the string in the upper right hand corner. The oval-shaped folding glasses at the bottom have delicate short temples with small circular ends and are represented in a touching painting by Franklin C. Courtner (1854-1947) after his death. The 16th President of the United States sits reading with his son, Tad (Figure 115) with the thin wire sides resting on his temples.

Ear-Fitting Spectacles—and Much More

Rich or poor, everyone had difficulty keeping spectacles in place...until 1880, when the first ones appeared with curved steel temples that fit snugly over the ears to hold them in place. (Kelley, 1978, pp. 60, 69)

Finally by the late 19th century, firms began making spectacles in a form we take for granted today—viz., resting on or wrapping around the ear. The application of spring steel and fine nickel to the making of full ear pieces with lighter, flexible frames in the

Figure 114. Lincoln's spectacles



1880s made it possible to bend the sides around the ears, giving a better fit, increased comfort and a more stable eye wear (Andressen, 1998; Kelley, 1978) and, even better, made spectacles more affordable (*Spectacles and Sunglasses*, 2005). With the advent of spectacles securely anchored to the face, no other era has produced better eyewear solutions for easier reading and writing than from the late 19th to the 21st centuries, with innovations including single-focus reading glasses, sunglasses, advanced bifocals, trifocals, progressive lens, contact lens, and most critically, individual eye prescriptions (see *Side Bar*)

Age-Old "Do-It-Yourself" Spectacle Fitting

Choosing the best spectacle strength for glasses changed little from the inception of vision aids until the early 1900s! In fact, we still use a similar method when picking out reading glasses at the local drugstore today! In what might be called a "potluck type" reading practice, a person would decide if he/she wanted a single or dual lens and then by reading, try various trial strengths until the letters were no longer blurry or too small.

Peddlers using this type of do-it-yourself fitting were "largely responsible for the spread of single and dual eyeglasses around Europe" (Crestin-Billet, p, 2004, p. 26) beginning with the mass production of spectacles in Germany in the early 1500s. Numerous paintings and etchings show how vendors set up stalls in towns or came door to door to sell their wares. Figures 116 and 117 picture this enduring fitting practice that literally has lasted for hundreds of years.

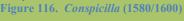




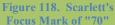
Figure 117. *Try This Pair* by Hardy (1864)



In the first quarter of the 18th century, Edward Scarlett (1688-1748) advertised his newly invented "Focus Mark" to help people identify the strength of the spectacles (Orr, 1985, p. 88).

In Figure 118, the "70" is etched into the glass, probably meaning the lens was suitable for a 70-year-old person (Fleishman, 2011g).

Another trial-and-error method more specific to the intelligentsia was to order numerous pairs of different strengths to try out at home as Jefferson did in 1806 (see *Side Bar 11*). In a 1777 letter describing the process to his youngest sister, Jane Franklin Mecom, Ben Franklin gives this advice:





... I send you a Pair of every Size of Glasses from 1 to 13. To suit your self, take a Pair at a time, and hold one of the Glasses first against one Eye, and then against the other, looking on some small Print. If the Pair suits neither Eye, put them up again before you open a second. Thus you will keep them from mixing. By trying and comparing at your Leisure, you may find those that are best for you, which you cannot well do in a Shop, where for want of Time and Care, People often take such a strain their Eyes and hurt them. I advise your trying each of your Eyes separately, because few Peoples Eyes are Fellows, and almost every body in reading or working uses one Eye Principally, the other being dimmer or perhaps fitter for distant Objects.... When you have suited yourself keep the high Numbers for future Use as your Eyes may grow older; and oblige your Friends with the others. (Franklin Papers, July 17, 1771)

By the late 19th century, shopkeepers sold eyeglasses. (As noted earlier, Lincoln bought his first pair in a jewelry store in Illinois.) By 1901, Minnesota had the world's first optometry law to protect the public against "exploitation of traveling spectacle peddlers" (Kelley, 1978, pp. 77-78).

Side Bar 12

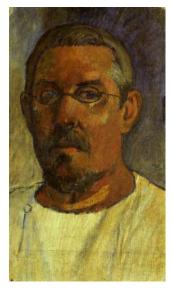
12 and Figures 122-123).

Modern spectacle history falls into two distinct time periods: (a) the advent and development of ear spectacles from 1880-1950, and (b) the era of fad and fashion from 1950-the 21st century.

The Advent of Modern Spectacles: 1880s-1950s

The predecessors of today's hooked-shaped side arms were called *curls*, *curl temples* or *riding bows*, the latter stemming from its association with horseback riding. Popular around 1880-1920s, these spectacles along with a similar model called *Windsor Eyeglasses* had round lenses, a nose saddle that rested right on the nose (but no nose pads) and stems that looped somewhat tighter behind the ear than riding bows. John Lennon, Groucho Marx, Gandhi, and Stalin wore this type of spectacle, as have David Letterman, Whoppie Goldberg and the fictional Harry Potter (Windsor Eyeglasses, 2011).

Gauguin and Monet. French artists Monet and Gauguin also donned an early form of ear spectacles. While Monet never painted himself with glasses, Paul Gauguin (1848-1903) did (aet 54), eight months before he died of syphilis. In his later years Gauguin could not Figure 119. Gauguin's selfportrait with spectacles



distinguish faces, paint or read (or write) without his glasses. According to Danielsson (1966) when the experienced editor and journalist could no longer paint, he wrote prolifically. However, in September 1902, his close friend and poet-prince, Ky Dong picked up a brush and started a painting of Gauguin; though ill, the artist finished his last self-portrait with a mirror—a grey-haired, sick man with oval fine wire-framed curl spectacles popular at the turn of the century (Figure 119).

Claude Monet (1840-1926) wore round Windsor-like tinted "cataract glasses," the thick right lens adjusted for high astigmatism after his 1923 surgery (Figure 120) on his right eye. Because he refused to have the left eye cataract removed, the thinner left spectacle lens was made cloudy to block the images so as not to interfere with the right eye's improved vision (Marmor & Ravin, 2009).

Figure 120. Monet's earfitting glasses

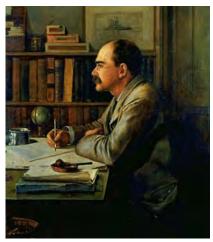


From 1910-1923 Monet's vision progressively worsened, as did his mental health. The artist's handwriting visibly changed; he had difficulty reading, painted by compensating for color distortion, and used "a style that did not require precise eyesight" (Marmor & Ravin, 2009, p. 141). Even with the special glasses he struggled the rest of his life with colors, and while he wrote the doctor in 1924 that he had given him back, "the sight of black and white to read and write," Monet complained that..."the vision of (this) painter is lost...(and) life is torture for me" (p. 169) (see Footnote²⁴).

As with painters, vision aids played major roles in the professional work and mental health of 20th century authors. Three famous 20th century writers, Rudyard Kipling, James Joyce, and Ernest Hemingway struggled with poor eyesight that greatly influenced their production, complicated their literary lives, and affected their psychological well being.

Rudyard Kipling. Kipling (1865-1936), as pictured by his uncle Sir Philip Brune-Jones (1861-1926), was a slight middle-aged Englishman with a distinctively large mustache. In Figure 121, he wears thick glasses in his study just a few years before he received the Nobel Prize for Literature. The small fine-wire spectacles curve round his ears as he pauses in his writing.

As a precocious schoolboy with myopia, scholars think Kipling suffered migraines and eyestrain from reading too much in poor light. He had to wear thick concave glasses, earning him the nickname "gig lamps or gigger," (see Footnote²⁵) slang for Figure 121. Rudyard Kipling in his study



spectacles (Page, 2010). One of the great Victorian/Edwardian writers, his personal letters suggest that his eye problems were exacerbated by overwork and eye fatigue, i.e. writing too long at a time. Kipling said that his headaches made "letters hop in front of his eyes" and reported that he "could only avoid the shadows (of depression) by writing until he could no longer see." (Sheehan, 2004).

James Joyce.

Figure 122. James Joyce (1935)



Fate with cruel precision, struck Joyce, like Beethoven, in the very organ necessary for the practice of his art. (Maddox, 1988, p. 189)

Like Kipling and Monet before him, eye problems hit at the very core of James Augustine Aloysius Joyce's (1882-1941) professional being. Unfortunately, eyesight issues were only somewhat ameliorated by vision aids. In a painting (Figure 122) by Jacques-Emile Blanche (1861-1942), the Irish novelist, poet and playwright is turned away from the viewer because he was so conscious of the thick bulging left lens (Saywell & Simon, 2004, p. 343). While his first glasses were pince-nez, he is best known for his iconic enormous Empire-style oval tortoise shell glasses that were all the rage in Europe. So popular were these, that one writer characterized Joyce and his fellow contemporaries as the "tortoise-shell-spectacle generation" (Corson, 1967, p. 229).

Widely considered to be one of the most influential authors of the 20th century in the development of the modern novel, Joyce's writing time was constantly high-jacked by severe eye problems. "Visual deterioration plagued him for more than half of his lifetime" (Ascaso & Bosch, 2010, p. 60). Eye pain, light sensitivity, blurry vision and headaches required 13 different surgeries for secondary glaucoma, cataracts, and constant treatment of severe infections of the iris (*iritis*). He would have to stay in dark rooms for weeks at a time recovering. After one such iritis attack in August, 1921, that lasted five weeks Joyce wrote, "I write and revise and correct with one or two eyes about twelve hours a day I should say, stopping for intervals of five minutes or so when I can't see anymore" (as cited in Ellmann, 1982, p. 517).

Almost blind at his death, Joyce used various vision-enhancing strategies as his eyesight worsened in order to continue writing. In addition to taking five-minute breaks to rest his eyes and writing with one eye covered or shut, he (a) used multiple magnifying glasses to enlarge the letters; (b) orally dictated to various *amanuenses* including hired literary assistants, along with his wife and son; (c) enlisted them to read back what he had dictated or wrote; (d) used charcoal and crayons to write in large child-like print large enough for him to read; (e) resorted to strong window light and good reading lamps to see letters better (Ellmann, 1982; Gilbert, 1957; Maddox, 1988); and (f) at one point, even tried recording a few pages of his last book (*Finnegan's Wake*) which were written in letters half-inch high. Poor lightening, however, made it difficult for him to read the print (Ascaso & Bosch, 2010).

Joyce's best-known strategy was his famous notebooks in which he collected and jotted

Figure 123. Example of 2 pages from Joyce's *Finnegan's Wake* notebook

Click here to view image of Figure 123 down ideas, phrases and words that he liked in pocket tablets (see Figure 123), crossing out entries in various colors as he incorporated them in his novel, often with

the use of a "huge oblong magnifying glass" (Budgen, 1932, p. 172).

Figure 124. Hemingway in Kenya (1953-54)

Joyce's constant battle to write and read his own writing was critical to the content of his stories as well as his dayto-day writing process. Kaplan (2008) suggests that Joyce's eye afflictions and poor vision were both a curse and a blessing for Joyce's rich narratives illustrating the human condition and illness, in part were due to his struggle with severe vision problems.

Ernest Hemingway. Joyce, Kipling, and Monet

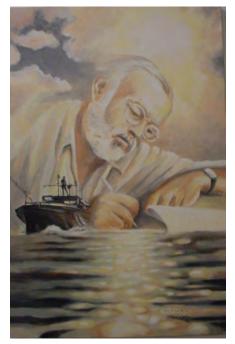
all suffered from depression associated with deteriorating eyesight—so too, did Ernest Hemingway (1899-1961). In fact, Valarie Hemingway's biography (2004) tells of



Ernest's failing eyesight and how it irrevocably struck at the heart of what he could always rely upon—his writing. In an interview, she said that

Hemingway read approximately three books a week, as well as many magazines and newspapers. He fished and hunted, both of which required keen eyesight. The fear of losing that capacity was devastating to him. Concern about his condition interfered with his ability to write and contributed to the deep depression that led to his decline and suicide. (Hemingway, 2004, p. 321).

Figure 125. *Hemingway* by Randy Hofman (c. 1996)



The Era of Fad and Fashion: 1950s-Present Day

Spectacles are such unequivocal evidence of old age and infirmity that (people) desire to dispense with exhibiting them as long as possible.

(Dr. Kitchiner, *Economy of the Eyes*, published in 1824 as cited in Corson, 1967, p. 125)

For the most part, up until the mid-20th century, glasses were all about the struggle to read and write well— weapons against infirmities of visual

Papa Hemingway (aet 32) began wearing glasses in the summer of 1931 (Meyers, 1985). Early photos show him with round lens Marshfield-style models with a nose pad and thin wire-bound frames. Later in the 1950s, Hemingway was known for his masculine-looking Rodenstock Aviator-style glasses as seen in this photo taken on his second Kenya safari in 1953-1954 (Figure 124). Contemporary artist Randy Hofman painted Hemingway (1996) with his aviators in a similar writing pose but with his working literary life juxtaposed with his vigorous sports persona (Figure 125).

As an aside, P. G. Wodehouse gave some amusing advice to writers in the 1930s (like Hemingway and Joyce) for crafting the looks of fictional characters with regard to vision aids (see *Side Bar 13*).

Fictional Characters with Glasses—Here are the Rules!

Asserting that he thought it " absurd these days to go on writing for a normal-sighted public" P. G. Wodehouse gave these rules for writers in 1930:

- Spectacles should be worn by good uncles, clergymen, good lawyers, and all elderly men who are kind to the heroine. Bad uncles, blackmailers and moneylenders should also wear spectacles.
- Pince-nez should be worn by good college professors, bank presidents and musicians. No bad men may wear pince-nez.
- Monocles may be worn by good dukes and all Englishmen. No bad man may wear a monocle.
- Beastly tortoise-shell-rimmed things should never be worn in fiction and it is time that a stop be put to this arbitrary state of affairs (as cited in Corson, 1967, pp. 221-222).

Sidebar 13

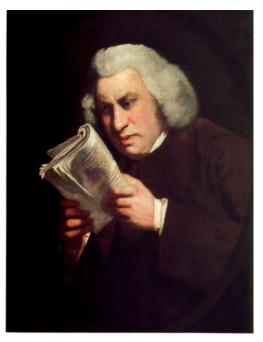
impairment, eye disease or old age. As we have seen, while an esteemed insignia of wisdom, scholarship and intellectualism, spectacles also symbolized vanitas and the deterioration and eventual death of us all (e.g., Jerome).

Since the invention of spectacles (some 665 years before) both men and *especially* women have been self-conscious about wearing glasses in public and often did so *only* behind closed doors until mid-20th century. No wonder the female sex rarely wore spectacles to read publicly and were seldom painted with them, when academic studies like the one in the 1920s characterized women with glasses as disagreeable and Dorothy Parker (1893-1967), the author and humorist, quipped in 1937 that "Men seldom make passes at girls who wear glasses." The French encoded "Good morning glasses, goodbye girls" (Andressen, 1998, p. 27).

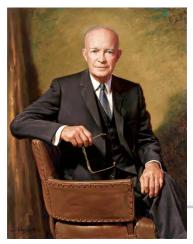
Even men had a problem. Samuel Johnson (1709-1784) refused to have his picture painted with spectacles and criticized his friend, Sir Joshua Reynolds, when the artist pictured him as shortsighted—squinting at the print unnaturally close to his nose (Figure 126). "It is not friendly to hand down to posterity the imperfections of any man," said the most famous man of letters in English history (MusEYEum News 2, 2010, p. 2). The portrait is "affectionately known as 'Blinking Sam'" (Boehm, 2006).

More recently, others have had an aversion to appearing in public wearing reading glasses. For instance, at his first formal address in London at the end of WWII (1946), Dwight D. Eisenhower (1890-1969) wrote his speech

Figure 126. Nearsighted Dr. Johnson



nightly for 3 weeks reading it aloud over and over to anyone that would listen. According to biographer Stephen Ambrose, (1991), Ike practiced the address innumerable times so that he could memorize it and deliver it spontaneously—*without* his



Figures 127-128. Eisenhower with plastic and gold-framed browline spectacles



glasses. In countless paintings and photos, Eisenhower gold-framed ectacles
Eisenhower rarely had glasses on his ears, but often in hand, as in his official Presidential portrait that hangs in the White House (Figure 127). The 34th President (1953-1961) is holding goldrimmed *browline* glasses (Deanof-Men style) as shown in Figure 128 (see Footnote ²⁶). Due in great part to the marketing strategies and innovations of European and particularly the Americans optical communities, a fundamental change in the design of eyewear and the attitudes toward spectacles began while Ike was President (1953-1961). Manufacturers like Amor, Vogue and others began advertising glasses as glamorous for women and seriously professional for men—as depicted in a 1957 French colored lithograph (Figure 129) entitled *AMOR Lunettes*.

By the 1960s and the heralding of synthetic materials, glasses had become a fashion accessory; demanding style, comfort, and functional design. With the invention of

Figure 129. AMOR Lunettes



plastics and the combination of iron, steel and nickel with celluloid, acetate or nylon, costs came down, glasses were light on the face, creativity was sparked and colors abounded. Public prominence was no longer as much of an issue for most people and ironically frames now covered almost one-third of the face! With this fad and fashion of spectacles came one significant trend: a conspicuous lack of literacy artifacts in artwork as the following examples show.

One of the most interesting female eyewear phenomena of the 1950s and 1960s was the winged shaped glasses commonly called cateyes or bat-wings. Many were surprised when Grace Kelly was photographed wearing this frame in 1955 when she visited Monaco—taken-aback that a woman of such beauty would dare wear eyeglasses





in public (Crestin-Billot, 2004).

Few women had the audacity to be painted in bat wing glasses. In one rare example, contemporary painter, Alexis Smith (1985) ridiculed Dorothy Parker's quip (above) by placing the cateyes on Marilyn Monroe in a large wall painting installed at the Museum of Modern Art in San Diego (Figure 130).

Three painters distinguished themselves among the hundreds of contemporary

artists in documenting spectacles as increasingly common artifacts of late 20th century society—Andy Warhol, Alex Katz and Chuck Close. Although their representational work ran contradictory to the prevailing postmodern art of the time, it is of note that theirs and most other portraits of this era had very little to do with literacy. All three portrayed large unisex browline (plastic rimmed or semi-rimmed) glasses similar to Eisenhower's, the prevailing style particularly in the 1960s and into the 1970s (Figures 131-3).

Figure 131. *Julia Warhola* (1974) by Andy Warhol



Figure 132. *Poet Kenneth Koch* (1970) by Alex Katz

Figure 133. *Frank* (1969) by Chuck Close



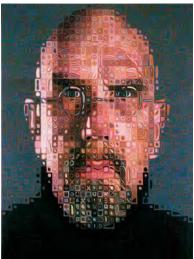


Aviator-style glasses had resurgence in the 1980s and through the 1990s (Figure 134). In these later decades of the 20th century, glasses grew even larger in size, particularly sunglasses which were now commonly made with individual prescriptions for reading (Figure 135).



Pop artist and filmmaker Warhol (1928-1987) wore glasses continuously, particularly oversized clear acetate Morse-style





eyewear (Figure 136). Warhol tended to paint celebrities like John Lennon and Lee Iacocca (Figure 134), whereas Alex Katz (b. 1929), with his colorful and bright figurative art, developed a style of portraiture that captured ordinary people peering out of large glasses that filled their faces (Figures 132 and 135). Figure 136. Andy Warhol with acetate spectacles (1976)



One of the finest working artists today, Chuck Close (b. 1940) was more interested in depicting images of people he cared about including friends and fellow artists. These

portraits showed eyeglasses as an important part of the personality on faces—startling in their size, sometimes 8-10 feet tall. Close, who ironically is "face blind," (Kosters, 2010) has painted a number of contemporary self-portraits suggesting that his smaller retro-oval 21st century spectacles are no small part of his identity (Figure 137).

As you might have gleaned from the last two sections on early vision aids and spectacles, *sight* and *light* are kindred concepts. Sight enhancing tools like monoculars and spectacles manipulate light for both the normal and poor-sighted—so the eye sees letters larger, clearer and brighter. Early readers and writers used mirrors for their marvelous illumination properties, i.e. their ability "to focus and concentrate light, and reflect it on to one's desk to help one in one's reading" as well as continuous writing (Thornton, 1997, pp. 167-168). It goes without saying, that good vision for reading and writing (as well as painting) requires *good light*.

With that in mind, the last section of this paper surveys the history of lighting and explores how painters portrayed natural and artificial light to illuminate scores of literacy activities and artifacts through the ages.

Illuminated Literacy

Vision aids extend one's artistic and literacy life into old age, whereas good artificial lighting extends it into the night. The 18th century biographer, John Boswell wrote of struggling to relume a candle he inadvertently snuffed out after a long stint of nocturnal writing; in the 16th century, Michelangelo grappled to see in the darkness with a candle strapped to his head while painting the *Last Judgment* in the Sistine Chapel.

Both literacy (the writer and reader) and painting (artist and viewer) are visual mediums, viz., how the eye and brain receive and interpret light. Optimal lighting, even during the

day, is critical. A multitude of vision problems are especially exacerbated by low or dim light. James Joyce with severe eye disease used window light to help him better see and edit his own words. Experts believe that artists active into their later years such as Rembrandt and Franz Hals (1581-1666) were plagued by the time they reached their 50s with presbyopia and depended as they aged on quality daylight to distinguish details and colors better.

Authors such as Joyce thought "lightwriting" was a beautiful word for painted pictures (Budgen, 1934. p. 175) and other writers have eloquently described light and darkness in prose.

Figure 138. *Night School* by Gerard Dou whose specialty was candlelight paintings



Artists, however, have added another dimension—they "painted light." They brought light out of gloom; showed how light penetrates the blackness; and, indeed, painted "radiant darkness." Using a Baroque technique called *chiaroscuro* (the arrangement and bold use of strong contrasting light and dark elements effecting the whole composition), their goal was to elicit strong emotional responses from the viewer and heighten the drama in intimate narrative scenes (Getty, 2007). Painting radiant darkness is a formidable challenge, tackled by many artists over the years, with only a few doing it *really* well (see Footnote ²⁷).

Gerard Dou (1613-1675) was one such expert painter. In *Night School* (1663-5) we see lantern and candle lit pages with barely discernible figures gathered around their glow (Figure 138). Three candles and a fourth inside a lantern illuminate this realistic nocturnal scene of adults helping children with their lessons. Considering that a standard candle gives out about 0.01876 watts, Dou gives a pretty good sense of how dark and shadowy the room was and how little illumination the candles actually gave.

On the other hand, some painters are guilty of greatly *exaggerating light with* scenes depicting more light emanating from a candle or lamp than possible. Art historians theorize that artists did not do this for artistic purposes but because they executed their works in poor/low light and expected their viewers to see the work in muted light as well.

An example of this practice of unrealistically representing actual lighting conditions can be seen in a colored engraving called the *Literary Club of 1781* by D. George Thompson



Figure 139. *The Literary Club* of 1781

(d. 1870). Set in Sir Joshua Reynolds's dining room at night, the faces of the literary party of bewigged and some bespeckled gentlemen gathered around the table are awash with light, their features bright and clearly distinguishable. Since candles project most of their light toward the ceiling, it is highly unlikely the candelabra with only eight flames could have shed that much light on the participants (Figure 139).

The painting portrays the club's

original nine members, "wits, authors, scholars and statesmen" in Washington Irving's words (1854, p. 150). On the far left is seated the biographer James Boswell (1740–1795) with glasses. To the right, slightly in front, is author and lexicographer Samuel Johnson (1709–1784) with a large brown coat, without glasses—remember he refused to be painted with them (see Figure 126). Painter Sir Joshua Reynolds (1723–1792) with his turn-pin spectacles (pictured earlier in Figure 98) is in red by the marble bust.

As a literacy practice, clubs initially were exclusive and reserved for upper class educated men who met for literary conversation and discussion. In the case of the Literary Club founded in 1764 by Johnson and Reynolds, the institution flourished through the 19th century, membership rising to forty in 1914 (with the election of Rudyard Kipling) and to fifty in the latter part of the twentieth century (Sambrook, 2009). As for men's literary clubs in the United States, groups still thrive today as a place for member readings, commentaries and literature discussion—of course, with the addition of women to the ranks (Literary Clubs, n.d.). In a modern version of literary clubs, psycholinguist Frank Smith popularized the term *literacy club* in 1988, as a metaphor for the social nature of learning to read and write. The antithesis of Johnson's Literary Club, Smith issued an all-inclusive call for *everyone*, novice and expert, to join all who use written language as their life work in and out of the classroom (Smith, 1988).

The Muse del Prado painting called *A Philosopher* illustrates two other artistic light conventions (Figure 140). Dutch painter Salomon Koninck (1609-1656) used an *oblique light* source in his compositions, showing no obvious source of illumination. In this and many other works in his oeuvre, Koninck specialized in painting scholarly old men searching for the secret of everlasting life among page-worn tomes and papers lit by a mystical light.

Moreover, note how Koninick diffused the light in such a way that the eye is immediately drawn to the luminated book and pages. Whether serendipitously or by purpose, painters have regularly treated written material in this way to make it special, using light to set off the page or paper as the centerpiece of the work with a bright Figure 140. Literacy as centerpiece in *A Philosopher* by Koninck



shimmering quality that makes the text almost seem alive. The tome that Rembrandt's mother is reading with her wire spectacles (Figure 81), seen earlier, is another exemplar of this convention that from its inception has warmed the hearts of bibliophiles and art aficionados.

Considering these artistic conventions of light and literacy, the final section explores paintings that depict different sources of light, (natural, and artificial) that allow readers and writers to see text better and illuminate literacy events reflective of broader practices.

Natural and Divine Light

Light, for humankind, has assumed many attributes over time; knowledge, truth, even enlightenment. For ages, artist have imbued the natural and supernatural (divine) light sources in their works with other symbolic associations: (a) divine light alluded to Judeo-Christian faith; (b) starlight and moonlight personified romance, poetic intensity, and other worldliness; while (c) sunlight conveyed nature and bright, fresh feelings.

Holy Light

In the Judo-Christian tradition, light is a visible sign of the divine. The Gospels refer to God as the "the Light of Men," and Christ refers to himself as "the Light of the World. (Getty, 2007)

Figure 141. *Sketch for the Annunciation* by Goya (c. 1785)



son..." (Hall, 1979, p. 19).

Starlight/Moonlight

Indeed, all three major religions (Islam, Christianity and Judaism) are religions of the Book as well as of the light. In fact, one of their most persistent and magnetic attributes of religions and cultures throughout history is the light and its importance; one of their most persistant motifs was that of darkness-light, the sun banishing the darkness of evil.

The annunciation genre is perhaps one of the best to show how artists pictured the light of God emanating from heaven. As exemplified in Figure 141 by Goya (1746-1828), the Immaculate Conception paintings executed by the Spanish artists Murillo, Greco, Zurbaran, and Melendez are especially flamboyant and dramatic with big golden swashes of luminous beams emanating from either God or the Holy Spirit symbolized by the descending dove. The focal points, Mary and her most constant attribute, the open book, are drenched in the heavenly beams of golden light. "According to St. Bernard, Mary is reading the prophecy of Isaiah (7:14), "A young woman is with child..., and she will bear a

O'Dea (1958) suggests that "It is possible to read medium-sized print by moonlight, but to do so for any length of time would strain the eye" (p. 1). So as you might imagine, paintings of people reading or writing by moonlight or starlight are relatively rare; however, there are a few unconventional ones of note with literacy at the heart.

Figures 142 and 143 provide an interesting juxtaposition with contrasting titles, purposes and time periods. In an unusual nocturnal scene of the Madonna reading on the holy family's flight to Egypt (1582-87), the silvery moonlight shimmers across the landscape and together with the divine light from her nimbus, illuminates the book she holds (Figure 142). In a whimsical contemporary still life treatment of nocturnal light and literacy, *The Journey* (1987) by German painter Quint Buchholz depicts a crescent moon as a gleaming bookmark, lighting up title, illuminating knowledge in the dark of the night (Figure 143) (see Footnote²⁸).

Figure 142. Detail of St. Mary in Egypt (1582-7)

Figure 143. The Journey (1987)





Natural Light: Literacy in Daylight and Sunlight

The next section surveys examples of painters who skillfully played with the power of light and shadows, perfecting the art of direct and indirect daylight spilling on to manuscripts, books, newspapers and other reading materials, both indoors and outdoors.

Direct Sunlight. To give you a sense of the phenomenal strength of sunlight, the sun shines 168,000 times brighter than a single good candle. Impressionists loved to paint outdoor light and experiment with it. They were especially conscious of the changing colors of sunlight, and in fact, perfected special blue-ish or purple-ish tones to contrast the dazzling light with shadows.

Direct sunlight is hard to read by because of the glare and requires some shade as in Figure 144. However, for those over 50 years of age and struggling with hyperopia, brighter less filtered light is a boon for "tired eyes" (Figure 145). Set in a small village in Turkey, this learned old man is tilting the old

Figure 144. *The Reader* by Frank Benson (1910)

200+ year-old manuscript toward the light to



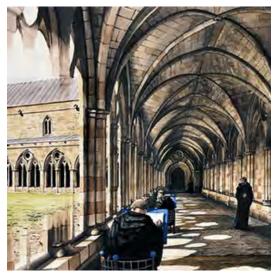




better see the handwritten old family recipes for medicinal herbs.

Indirect Natural Light. Indirect daylight is the best possible natural light by which to read and write without eyestrain. Ever conscious of light, medieval monasteries and

Figure 146. Rendering of a 13th century monastic cloister with north walk used as a scriptorium



scriptoriums were built in such a way that the monks could read and write in as much good daylight as possible and away from the sun's intense glare and the other outside elements. They often studied and meditated in cloisters (rectangular courtyard with covered walkways) to take advantage of the outside natural light. Since cloisters were usually situated south of the church, the north walkways received more indirect light and were the places to read and write. As Figure 146 illustrates, early monasteries used the shaded cloister walkways as scriptoriums where scribes composed or copied handmade manuscripts in good light (V & A, 2011).

Sometimes separate carrels (like we have in

contemporary libraries) were open to the cloister for better light (Figure 147). Scribes, as well as *illuminators* (who drew and painted the manuscript illustrations and decorations), would work there about six hours in good daylight, fulfilling other monastic duties when light was not as good. Because of the potential of danger from candles, writers would work until sunset (Avrin, 1991). In some cases scribes were very thankful for stopping then, as the following two quotes found in the margins of medieval manuscripts attests: Figure 147. *St. Thomas Aquinas* writing by a cloister



Thin ink, bad vellum, difficult text.

Thank God, it will soon be dark.

(as cited in Avrin, 1991, p. 224).

Natural light streaming indoors through a window on to reading material was another light source technique used by artists in narrative art to showcase interior literate activities. Below are several exquisite examples:

Rembrandt van Ryn (1606-1669) was known as a "painter of light and shade." In fact, "the basis of his art had, from the beginning been chiaroscuro..." (Gowing, 1995, p. 716). With uncompromising realism, he powerfully crafted the whole of his compositions around the contrasts between the two elements, dramatizing and emphasizing the strong

Figure 148. Scholar Reading (1631)



interaction of light and shadow. Some experts say his excessive realism exaggerated the light and over emphasized the dark shadows (Burckhardt, 1947; O'Dea, 1958); others, he was master of them.

For the most part, Rembrandt used oblique light as in the painting of his mother (Figure 81). However, *Scholar Reading* (1631) is one of several of Rembrandt's early dramatic presentations where he did not. In a quiet vaulted chamber he plunged the reader and his books into a bath of gold sunlight from a window (Figure 148). Using a common reading gesture, the bearded philosopher tilts the open book (propped up on several others) toward the window to better gather the light to the page. Note how the shadowed recesses executed with slow gradations

gradatic of

yellows, browns and blacks help the viewer perceive light to dark transitions.

Perhaps the best painter of light per se was Johannes Vermeer (1632-1675) another 17th century Dutch artist. Of the 14 Vermeer paintings that picture literacy artifacts, half (7) are naturally lit genre interiors in which women are working by a window. With details crisp and shadows skillfully rendered, Lady Writing a Letter with her Maid (Figure 149) is one such example. With strong daylight accenting the writing process, the woman pens furiously; the maid waiting to deliver the letter. Red sealing wax suggests the crumpled letter on the floor was just received and thrown angrily onto the floor. Confrontation and reconciliation through the written medium seem to be the theme.

Figure 149. Lady Writing a Letter with her Maid by Vermeer (1670)



Figure 150. Woman Reading a Newspaper (1975)

Click here to view Figure 150 at Corbis Images In a more placid scene (Figure 150), John Koch, known for his light-filled realistic paintings, gives us a wonderful 20th century version of a mature woman's need for *both* natural window light and glasses to support the reading process.

As suggested by Vermeer and Rembrandt's work, the reality of literacy was that it was pretty much dictated by the sun and the hours from sunrise to sunset for thousands of years. Man-made illumination, in the service of literacy and the nourishment of the intellect after dark was a long time coming.

Artificial Light: Extending Literacy into the Dark

Astounding as it sounds, humankind used only very primitive artificial lighting sources

up until about 200 years ago. Basically an *open flame technology*, types of illumination changed little from the birth of the Semitic Alphabet (19th century BCE) until the invention of electricity (late 19th century CE)! Battling the darkness and extending our ability to see written works into the night is the topic of the final section.

Three distinct periods of artificial lighting technology development (see Footnote²⁹) paralleled the spread of literacy and the growing need for illumination:

- 1. Early Flame Period (Ancient times-1780),
- 2. Enhanced Flame Period (1780-1880), and
- 3. Flameless Period (1880-present).

Early Flame Period (Ancient times-1780)

...With the fire lights and the burning brand in the hand of man; the conquest of light over darkness was signalized, and the night side of man's life and his progress toward culture became a theme of surpassing interest. (Hough, 1902, p. 497)

Light was Work!

The difficulty of studying or composing by open flame light at night cannot be emphasized enough. Below is a list of just some of the challenges:

- The use of fire, torches, oil lamps, and candles was stinking, smelly, smoky, greasy, messy, and dirty;
- Smoke, lampblack, grease and drippings did serious damage to plaster, painted surfaces, upholstery, as well as parchment/vellum pages of manuscripts and paper of printed books;
- Candles and lamps demanded constant attention, so that the reader/writer was interrupted every 15-20 minutes to tend the flame of candles and lamps (cleaning, gutting, and snuffing frequently);
- Seeing fine print with weak, sputtering flickering, finicky, dull and inconsistent light was difficult;
- Poor light resulted in eyestrain, deterioration and eye diseases; and of course
- There was the ever-present threat of spreading, devastating, uncontained fire from knocking over lamps/candles, explosions, flying sparks, etc.

Oh, how we take a flick of the light switch for granted!

Side Bar 14

Essentially from the dawn of writing, literates have had four choices of artificial illumination to release them from the bonds of darkness. These were universally dependent on burning material: (a) firelight, (b) torches, (c) oil lamps, and (d) candles. Colonial lamps differed little from those found in the Tombs of Ur in Mesopotamia some 5,000 years ago; candles (up until 1850s) were no different than Pliny the Younger (61-112 CE) described in 100 CE (Perry, 1969). For eons, both reading and writing by crude open flame were exceedingly cumbersome and challenging as compared to the lighting technology of today (see *Side Bar 14*).

Firelight. The advent of wood fires begins the history of artificial illumination; for they were, indeed, the first lighting technology. As Luckiesh (1920) suggests, "Fire not only banished the chill of the night but was a power over darkness.... The march of civilization had begun" (p. 4).

While painters used firelight to symbolize hell and damnation, they also portrayed the ancient practice of reading by firelight, sometimes realistically and others, not. Eastman Johnson's *Boyhood of Lincoln* is a stunning example of a faithful rendition of firelight (Figure 151). This true-to-life portrait with the firelight flickering on the open pages of the book turn toward the bright flames is one of self-education in progress.

In contrast, see how Solomon Alexander Hart portrayed the common recreational practice of reading aloud in front of a hearth in the 19th century (Figure 152). The woman's dress is appropriately bathed in firelight, but the lighting is wrong for the elderly man on the left and particularly on the surface of the book. Ostensibly entertaining the group with Shakespeare, the gentleman is holding his book the wrong way to catch the firelight in the otherwise dark room!

Figure 151. *Boyhood of Lincoln*: realistic fireside reading (1868)

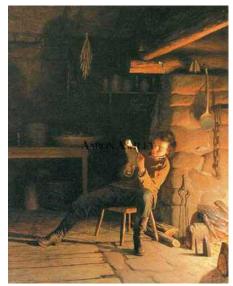


Figure 152. *An Early Reading of Shakespeare:* unrealistic fireside reading (1883)



Torches. With the light of the fireside came the torch (aka, burning brand), next in lighting development chronology. As the first portable independent artificial light, the torch has a different history from lamps. As an ancestor of rushlights, tapers and candles, the torch "predates the most primitive forms of lamps" (Robins, 1939, p. 6).

With little archeological evidence surviving, we do not know when early man began to use torches or how much they used them for literate activities. Written evidence suggests, the Greeks used torches exclusively up until the 6th century BCE when lamps were introduced. At first torches were bundled sticks treated with wax, resin, or pitch and later, metal or clay shafts with hollowed-out tops stuffed with oil soaked rags (Robins, 1939). Homer's poems (c. 7th century) mentioned pine torches. Those in

medieval times had bundled ropes soaked with pitch (DiLaura, 2006, p. 88). More recently accounts described the poor in backwoods America using pine natural torches (called light-wood knots or candlewood) as their only domestic illumination—even as late as the Civil War era in the south (Robins, 1939; Handy, 1876)

Torches gave off a bright warm glow, but reading and close work "done by their flickering light was a terrible strain on the eyes and the heat from the blazing wood was uncomfortable in the summer. Moreover, the pitch smoke was objectionable and blackened the walls." (Handy, 1876, p. 577).

Torches were common artifacts of Jerome's time; so conceivably he would have used them to write by, as in this painting. *St. Jerome Meditating* (1525) by Jan Cornelisz Vermeyen (1500-1559) shows the great writer alit by a flaming





torch as he ponders death with iconic leather bow spectacles lying on the open book (Figure 153). For dramatic effect, the light thrown by the burning brand is greatly exaggerated in this highly unusual portrayal. Notice how unrealistically the flame illuminates the putti and even the saint himself. "The skull, symbol of earthly vanity, is literally overshadowed by Faith in the shape of the torch borne by the angels, representing the light of Christian Truth" (Louvre, 2003).

Oil Lamps. While firelight and torches heralded the beginning of night life for the Stone Age man, a different technology emerged concurrently that had a more

profound impact on literacy: the oil lamp. Cleaner and easier to tend than torches, simple oil lamps had wicks of vegetable substances. Astoundingly oil lamps were the main source of light after dark for most domestic and literacy activities throughout the western world up through the 20th century.

Stone Lamps. The first real lamps of history were *stone burners.* Initially, early man used naturally formed rock crevices; then eventually, crafted portable hallowed circular depressions from limestone or

sandstone. Limestone had the advantage of not getting too hot; whereas most sandstone lamps because they were better heat conductors, had handles. One lamp put out a dim flickering light less than a standard candle's worth, but nonetheless "sufficient to guide a person through a cave or to illuminate fine work" (de Beaune & White, 1993).

Figure 154. Red sandstone oil lamp found at Lascaux, France (17,000 BP or 15,000 BC)



Remarkably, the discovery of possibly the earliest extant lamps provides a wonderful confluence of the histories of art, literacy and man-made illumination. The first evidence of artificial light usage specifically related to literacy are found on cave walls and ceilings in prehistoric cave painting sites in Europe, some as old as 32,000 years. Evidence suggests that Upper Paleolithic man *wrote* (i.e. producing a text) with cave drawings to communicate information through pictures: the step before the more sophisticated hieroglyphics of the ancient Egyptians (Wong, 2010). Without artificial lights that included open fat-burning lamps, as well as small fires and torches, man obviously could not have painted or, for that matter, viewed theses graphic Ice Age images hundreds of feet underground.

One of the most spectacular finds by Abbe Andre Glory at Lascaux, in southwestern France, was the spoon-shaped lamp in Figure 154. Made of red polished sandstone, the burner (8 ³/₄ inches long) with a shallow oval cup used deer fat for fuel and a wick made of a quarter-inch juniper branch. The handle was decorated with two abstract signs of chevrons (Eshleman, 2003, p. 182).

Figure 155. Artist's impression of cave painting with stone oil lamps



Figure 155 depicts an artist's rendering of how a few oil lamps may have illuminated the painting process. Jane Brox suggests in her book *Brilliant* (2010 pp. 7-9), that deep in pitch black caves of Lascaux, humans used no more than a handful of lamps to paint these murals; and if carbon dioxide built up, they would have had trouble keeping those lamps lit as they worked. While torches probably supplemented the few lamps, it was so dark that achieving the full color ranges as we see the images today would have taken 150 lamps (de Beaune & White, 1993).

Open Bowl or Saucer Lamps. The next step in lamp technology was the simple

bowl type made from clay and glass with a lip or groove to hold the wick. Often in olive or some other

vegetable oil, the flame would burn with the aid of the wick made of rush or twisted strands of linen and



then put itself out when the oil was used up. Like other variations to come, the lamps were portable, put in stands of varying heights, or hung by chains as in Figure 156. Notice the putto is using

a torch to light the open bowl oil lamp to luminate the Erythrean Sibyl's tome.

Greek and Roman Lamps. From the 6th-3rd centuries BCE, the inventive Greeks introduced more sophisticated pottery with spouts (nozzles) and



handles for holding the wicks and pouring in the oil. By the 3rd century CE, they closed in the lamps (now made on a potter's wheel) so the opening was merely a filling hole (Figure 157); by the 2nd century, manufacturing had turned to use of moldings and simple decoration was common. Romans lamps significantly differed in that they were depressed on the top around the fill-hole to a concave form, were fancier in decorative design, and generally had inscriptions of dedications or trade-marks (Figure 158). Although metallic lamps go back to the 4th millennium BCE, they were most common in the Roman period beginning in the 1st century CE (Figure 159). Frequently lamps were made with more than one burner as in Figure 160. Extant forms have been found with as many as 14 burners (Robins, 1939).

 Figure 157. Greek pottery lamp with convex top
 Figure 158. Roman pottery lamp with concave decorated top
 Figure 159. Roman bronze lamp
 Figure 160. Roman dual spout lamp

 Image: Ima

Sometimes called "wick channel " lamps, these more advanced modifications were handcarried (Figure 161), suspended by chains hung from a spike in the wall (Figure 162) or the ceiling (Figure 163), placed in a wall niche (Figure 164), or rested on a "candelabrum" or lampstand (Figure 165). Classical bronze lamps were known for multiple lights and more common in Roman households than earthen ones. Put on stands or hung, these gave wider light for reading and writing (albeit rather meager as compared to today's standards) when suspended high in the middle of a large room as in Figure 166.

Figure 161. Hand-held metal wick channel lamp



Figure 164. Wall niche oil lamp



Figure 162. Catacomb spike hanging wall lamp

Click here to view image of Figure 162 at Art Resources

Figure 165. Roman lampstand



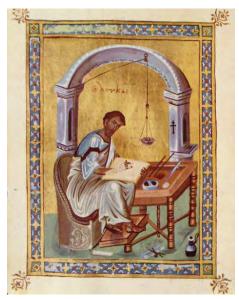


Figure 166. Scholar in his study lit by multi-burner metal oil lamp



Floating-wick lamps. Associated with the early Christian and medieval eras, floating-wick lamps are distinguished by (a) oil poured over the surface of water, (b) bowl, bell, funnel-like or cone-shaped glass form, and (c) wick suspended in the middle of the container without any spout or nozzle on the side to hold it. Originating in Egypt, these float primitive lamps spread through the

Figure 168. St. Luke illuminated by an adjustable float lamp as he writes



Byzantine culture; and migrated westward,

for the most part, perpetuated by the Jewish, Christian and Islamic ecclesiastical communities as "sanctuary" lighting (Robins, 1939).

The simplest forms of single glass vases with either pointed or flattened bases (Figure 167) are pictured in early manuscripts hanging above Biblical or medieval authors (i.e., various saints or real-life portraits of famous clerics) who are often surrounded with writing artifacts. Figure 168 is a gospel frontispiece illumination of Saint Luke (mid-10th century) in the *Constantinople New Testament* showing this type of open flame lamp in use.

Notice the ingenious pulley installed to

raise and lower the lamp for more direct light for writing.

By the early 6th century CE, float lamps were adapted into hanging chandeliers by inserting them in suspended disks in Islamic, Jewish and Christian churches, thus, providing light for religious ceremonies and the reading of "The Book," the heart of the religious services. Rows of these sanctuary vase lights suspended by chains can be seen in early Jewish miniatures such as Figure 169 from the Sister Haggadah (1350). A Hazzan is reciting orally the Haggadah from his raised pulpit (bimah). In addition to reading aloud to the illiterate congregation, the cantor also was responsible for attending the synagogue lamps.

ceremony

Figure 169.

A Hazzan in a Spanish Synagogue with hanging float-wick oil lamps lighting the

Figure 167. Glass floating-wick

oil lamp, 4th century CE

75

The Windmill Psalter (1280-1300) provides a good example of Christian liturgical chanting lit by funnel-shaped float lamps hung from the ceiling (Figure 170). Four tonsured clerics share an open manuscript with musical notation on a lectern with a fishFigure 170. Monks chanting by the light of 3 lamps



shaped stem. The scene, like others we have seen before (Figures 70-71), shows a typical medieval small group shared reading event. The three lamps are so small, however, that they seem purely symbolic or decorative and could hardly have produced enough candlepower by which to read.

Georges de La Tour (1593-1652), another exceptional master of light and darkness, painted *Magdalene of the Smoking Flame* (1640) picturing the floating-wick lamp with excruciating and realistic detail. The brightly burning wick with water and oil in a clear glass container (Figure 171 and detail) exquisitely illuminates the books, vanitas skull, body

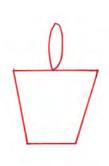
and clothing of Mary. The glass container bears a striking resemblance to lamps pictured in an Egyptian hieroglyph found at the Rocks Tombs of El Amarna (Robins, 1939, p. 45) as drawn in Figure 172.

Figure 171 and detail. Magdalene with glass open lamp with floating wick by La Tour.





Figure 172. Egyptian hieroglyph of floatingwick oil lamp (1353 BCE)

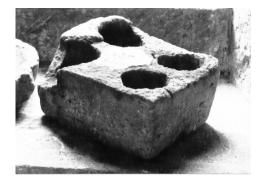


Taken all together, the story of lighting in the dark ages and early medieval times is one of regression. For instance, in England and Normandy, torches were the mainstay supplemented with the crude earthenware open lamp types with no spouts such as the

floating-wick design above—far inferior to the closed lamps of the Romans. In fact, the square cresset-stone lamp (Figure 173), an even more primitive form popular in the British Isles until the close of the Middle Ages was "little removed from the hollowed stones of prehistoric lamp-makers" (Robins, 1939, p. 88) (see Footnote ³⁰).

Crusie Lamps and Variations. With the addition of a wick support, early iron *Crusie*

Figure 173. Primitive cresset-stone lamp with four cups from Bindon Abbey, Dorset



lamps were a slight improvement over ancient open lamps such as the cresset stone—but not much. With origins in northern Europe and popular from the 16-17th centuries in the West, plebeian Crusie lamps burn most animal fats (tallow) giving a strong odor. They were distinguished by a pear-shaped or ovoid open bowl to hold the oil attached to an arm with a hook and spike, which allowed them to be hung from a ceiling or suspended from a wall (Figure 174). Found throughout Europe (except for England), most had a second bowl beneath the first to catch the unused oil. In America these *double Crusies* were known as *Phoebe* lamps (Figure 175). German speaking countries tended to favor the single "pan lamp" without a drip-catcher; and with that influence, enclosed American forms with one-pan lids evolved in Colonial times called *Betty* lamps (Figure 176). A wick holder was created in the base of the lamp and the cover meant less smoke and better light (Boyle, 2002; Old Time Lamp Shop, 2007; Robins, 1939).

Figure 174. Crusie Lamp



Figure 175. Phoebe Lamp with double pan



Figure 176. Betty Lamp with lid



Instances of early European Crusie pan lamps are represented in several realistic nocturnal 16-17th century paintings (Figures 177 with detail and 178).



Figure 177. Matthew writing by the light of an early crusie lamp (1534)



Italian Giovanni Girolamo Savoldo's (1480-1548) specialty was night scenes and unusual effects of light and reflections. In Figure 177, the angel shrouded in almost complete shadow is offering inspiration to Matthew as the glow of the lamp shows him in the act of writing with pen in one hand and inkwell in the other. The lamp makes the paper radiate

Figure 178. Girl filling a pan lamp with oil (1650)



and the lines of text luminous. Flames and sparks throw up more light on the right where three men gather round a fire.

French painter Trophime Bigot (1579-1650) was known as the "Candlelight Master" with his entire oeuvre consisting of nocturnal scenes of candles, torches and lamps with strongshadowed but subtle chiaroscuro much like La Tour (Figures 77, 78, and 171). In Figure 178, the intensity with which the woman is attending to the oil suggests the dangers involved by pouring fuel into the Crusie lamp while the wick is aflame.

Candles.

The candle was a comparative late-comer to illumination of which the earliest positive evidence dates only to the 1st century CE. (O'Dea, 1958, p. 18)

After the lamp came the candle. Evolving historically as a child of the torch, the splinter and rushlights the candle had a very different path of development than the lamp (see Footnote³¹). Although, for the most part, torches are wickless, the distinction between candle and torch is often blurred. In fact, the two sometimes look so similar in early paintings that one is hard pressed to tell the difference. For instance, is the flaming taper held by Rabbi Gamaliel as he instructs his students in a miniature from the *Sarajevo Haggadah* (c. 1350) (Figure 179) a candle or a torch?

The Romans were thought to have developed the wick candle made from beeswax, although we know from Pliny the Younger's writing that they had tallow candles too (O'Dea, 1958). "Most early Western cultures relied primarily on candles rendered from animal fat (tallow)" (History of Candles, 2010). If extant paintings are any judge, candles were the

Figure 179. Rabbi Gamaliel and students from the *Sarajevo Haggadah*



dominant source of illumination for literate activities over oil lamps through the Middle Ages and Renaissance.

Ironically, candles were much more labor intensive to make and maintain than oil lamps. In addition to the low uneven burn and flickering light, reading and writing were interrupted regularly to attend to the candle. One had to snuff them (trimming the burned wick off) every 10 minutes and also watch for guttering (loose molten wax that accumulates around the wick). If not, the light would be diminished to about a quarter of intensity—snuffing and guttering is messy, but also tricky, because one could easily put out the candle. A draft could readily blow out a candle and if it was doused improperly, the candle would give off smoke and an acrid stench (Brox, 2010, p. 14).

The next section explores several sub-themes of candles and literacy in paintings: (a) ecclesiastical, (b) symbolic vanitas, and (c) domestic motifs.

Religious Literacy. The spirit of man is the candle of the Lord.

(Proverbs 20:27)

Candles had two functions in religious communities: symbolic/ceremonial and pragmatic. The candle stood for the light of faith and was/is an integral artifact of all religious ceremonies in the three major Western religions (Moslem, Jewish and Christian). Moreover, candles were critical for light to read properly in these services and other church-related activities.

In the Christian church, beeswax candles were used in church proper for altar use and exalted ceremonies/special occasions, while tallow ones (from carefully saved kitchen fats) light scriptoriums and common areas of the monasteries and grounds. While tallow candles were smoky and pungent, beeswax was much better in giving a fragrant, clear and steady burn. However, as a luxury item, beeswax candles were "rare and costly, being the province of only churches and the wealthy" (Brox, 2010, p. 11), costing four times as much as tallow candles (Bryson, 2010, p. 116). Since the wax came from bees that were considered by the ancients to be divine (O'Dea, 1958), monasteries had special monks that tended bees and provided wax for Holy Day celebrations and masses (Mitchell, 1969). Figure 180. Sabas reading aloud with a long

An old 12th century miniature pictures a wonderful example of a long thin beeswax taper being used specifically to illuminate the reading of a manuscript. Holding the candle in one hand to light the page, the Monk Sabas reads aloud to the Emperor seated on his throne (Figure 180). The large book with bold letters rests on a lectern. This painting is particularly remarkable because it depicts the aging monk relying on over-sized script to enable him to read smoothly without stumbling or hesitation. As mentioned earlier, works to be read publically demanded a larger format, consequently accommodating for both poor eyesight and dim light (see Side Bar 6).

taper to light his manuscript

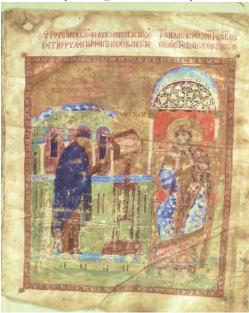


Figure 181. Candlelit Office of the Dead: Vespers



The next four paintings show both ceremonial and pragmatic uses of candles. A common Roman Catholic motif in illuminated manuscripts miniatures is the burial mass called the "Office of the Dead." The scenes were generally teeming with beeswax candles in as much as their wicks were "symbolically linked with the soul" (O'Dea, 1958, p. 142). In an evening vesper example from the 15th century Umfray Hours (Figure 181), seven tapers in footed candlesticks surround the casket, two large candles stand on the altar and a tonsured monk holds a larger Paschal candle. Together the candles illuminate the multiple books being read at this Requiem Mass, literacy being at the heart of the funeral scene.

And thou shalt make a candlestick of pure gold: ...and though shalt make the seven lamps thereof; and thou shalt light the lamps thereof, that they may give light over against it..." Exodus 25:31

As an injunction in the *Old Testament*, the original Hebrew seven-branched candlestick was actually not a candlestick at all, but instead a group of floatwick lamps. Figure 182 is curious because above Joseph is a hanging Hanukkah lamp (menorah), although it is hard to tell if it contains candles or open flame lamps. Both a flaming taper and a torch on the wall light the high priest's book. In this presentation scene, Mary and Joseph are bringing the infant Jesus to the Temple in Jerusalem to "be consecrated to the Lord" (Luke 2:22-39). The caged doves in the left foreground allude to the theme of purification (Hall, 1974).

Figure 183 shows the lighting of the menorah candles that illuminate the open Talmud below on

Figure 182. *Presentation in the Temple*: Example of Jewish Menorah, torch and candle lighting in a Jewish synagogue



the table, spectacles belonging to the old cleric resting on the open seam. A portrait of Moses with the Ten Commandments hangs on the wall to the right. The Jewish Festival of Lights dates back to 165 BCE when the Jews were victorious against the Hellenist Syrians and is celebrated for eight days in November and December.

Figure 183. Last Night of Hanukkah: Jewish cleric celebrating the Jewish Festival of Lights



In Islam, mosque candles (and oil float lamps) indicated the presence of the divine, wisdom and truth that lightens the darkness. Figure 184 depicts Nawab of Oudh (a famous Sunni Muslim religious

Figure 184. Nawab reading loud



scholar) reading aloud at night during the Muharram Festival in Lucknow, India. Candle sconces ring the room and a large flaming chandelier lights the *maulvi* below as he

reads the scriptures to the attending worshipers.

Vanitas Still Life. As illuminated manuscripts suggest (Figures 79-81), candles in paintings were initially tied to rituals and church narratives from the early Judeo-Christian times through the 1500s. The beginning of the 16th century brought a new type of candlelight painting, the vanitas or skull motif.

Serving as a transitional genre with recurring iconographic components of candle, writing materials, inscriptions and books, these vanitas works bridged the divide between the religious and nonreligious with a complicated mixture of the church spiritual messages about one's mortality and a reaction against the wealthy by the intelligentsia and merchant classes. Two clearly different vanitas forms evolved at the end of the first quarter of the 16th century: (a) Jerome in his Study portraits (seen earlier in Side Bar 8 and Figures 76-79) containing only several vanitas elements, and (b) still life vanitas depictions (divorced from figures) of solely inanimate objects (see Side Bar 15), including candles and literary artifacts.

Vanitas Candles

He who thinks of death can easily scorn all things.

(By Hieronymus in *Epistolae* [53, 11, 3] as cited in Schneider, 1999, p. 77)

In the 1500s a form of still life emerged called *Vanitas* (Latin for vanity) or *memento mori* flourishing particularly in Holland in the 17th century. Generally, the genre referred to a collection of objects that stood for the brevity of life and transience of earthly pleasures.

While the lit candle in paintings meant the flame of life, the barely flickering, and of extinguished course, the candle, were metaphors for death or that time is running out. For instance, in the earlier mentioned Death of Mary motif (Figures 70-71), the dying (or dead) Virgin often holds either a waning or extinguished candle. In Jerome study themes (Figure 76), the snuffed candle and the accompanying spectacles signified old age, failing eyesight and impending demise. Books and notes/inscriptions accompanied by the candle signify transience of human knowledge and vanity of scholarship, and the ephemeral nature of thoughts on paper.

Side Bar 15

Figure 185. Early vanitas still life (1524)



One of the earliest examples of the latter is by Bruyn the Elder (1493-1555) (Figure 185). On the back of a portrait of Jane-Loyse Tissier, "the detached jaw suggests the dissolutions of the personality, the snuffed-out candle the extinction of life, the fly—symbolic of the devil—the maggots that will slowly destroy earthly beauty" (Ebert-Schifferer, 1999, p. 31). A note in the right hand corner says in Latin that "Everything decays with death/death is the final boundary of all things" (Schneider, 1999, p. 77).

Nonreligious/Domestic Literacy. As for lay activities of reading and writing at night at home and work in this early period of open flame technology, the vast majority of the Western population depended on "tallow candles" as the chief source of light up until the

1860s when better paraffin candles were produced. Even the best-read people used tallows sparingly because of cost and availability issues.

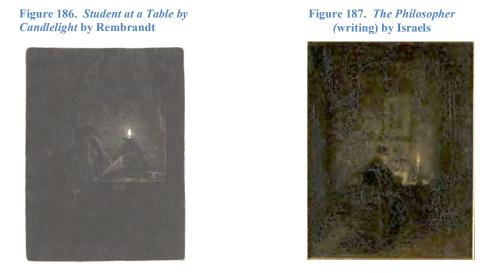
Reading and writing had to be difficult because a single "good" candle could barely penetrate the darkness, giving only 1/100th of the illumination of a 100 watt-bulb. As noted earlier (see *Side Bar 1*), vision problems of hyperopia, myopia and presbyopia are exacerbated at night when eyes are tired and by dim or poor light; and candlelight barely sheds enough light to see small print with normal eyesight. Bryson (2010) astutely points out that opening our refrigerator door "summons forth more light than the total amount enjoyed by most households.... [from antiquity until the late 19th century]. The world at night for much of history was a very dark place indeed" (p. 12) (see Footnote³²).

Paintings began capturing this idea of dim candlelight in a wide range of non-religious and domestic literacy settings and events— but not until the 17th century. A survey of the corpus of nocturnal candlelight portraits of the next two centuries show a broad range of purposeful secular activities (Figures 186-195). Lay men (and a few women) were pictured reading/writing for educational, scholarly, professional, communicative, informational, and recreational reasons. Earlier paintings presented here (Figures 37, *Night School and* Figure 38, *The Literary Club*) are good exemplars of early childhood education and group erudite pursuits by candlelight.

Of all of the works, the first two examples below give you the most dramatic and realistic sense of how it was to read and write, lost in a vast pit of shadow and inky black with a single burning flame (Figures 186-187)—this is the way it was for centuries before any significant advances were made in man-made lighting technology.

Why did people read and write by candlelight?

1. For budding academic study and deeper, continuing scholarship of the lettered; (Figures 186-187);



2. For purposeful professional and working life or recreation and enjoyment; (Figures 188-189);

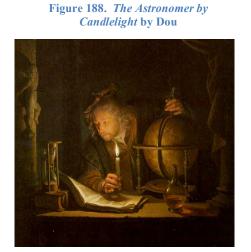


Figure 189. *Singing Couple* by van der Meer



3. For knowledge of what is already written or for imparting new knowledge (Figures 190-191) (note juxtaposition of young and aging vision);

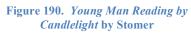




Figure 191. Old Man Writing by Candlelight by Terbrugghen



4. For private or group correspondence (Figures 192-193); and



Figure 192. Portrait of a (myopic) Man by Candlelight by the French School Figure 193. *Girl Reading a Letter with an Old Man Reading over her Shoulder* by Wright of Derby



5. For public or personal news and information (Figures 194-195).

Figure 194. *Reading the News* by Culvershouse

Figure 195. *The Politician* reading a newspaper





Enhanced Flame Period (1780-1880)

Evidence suggests that literacy was clearly a catalyst for rapid advances in lighting enhancement in the century from 1780-1889 (Perry, 1969; Robins, 1939). Rising literacy rates, demand for better light to read by, and wider range of availability of reading materials encouraged the first big surge of advances in lighting technology since ancient times. Three more efficient lamp fuels and central draft chimney technology lead the list.

Fuel Advances. Lamps and candles depended on vegetable or animal fat from their inception. Advances in types of fuel in the enhanced flame period (1780-1880) drove innovations in lamp technology and were critical in the transformation from ancient to modern lighting sources.

Whale Oil. The blubber of various whale species became a new source of illumination from the late 1700s until the 1860s when the whale population was devastated. The first oil to achieve commercial value, whale tallow was cheap and in demand in its hey-day because it burned brighter than other animal tallow (Figure 196). However, whale oil still smelled terrible, although not as bad as lard. The affluent used premium sperm oil with a better odor—with a price tag of some \$200 per gallon in today's currency.

Figure 196. Harpooning a whale (c. 1814)



Natural Gas. Leading innovation in the early 19th century was the first fuel without a wick, *gas.* Initially a byproduct of coal, gas's first application was in the UK at factories, shops and institutions that found candles prohibitive because of the expense and tending involved. The next major application of gas was for street lighting. Gas was especially popular in England and the United States with major American cities like Philadelphia, New York and Baltimore having gas works and streetlights by the 1830s (Brox, 2010, p. 60). Gas was not available for domestic use and did not become common in homes until the 1850s (Bryson, p. 123). Because gas took special burners, and more importantly, a distribution and installation system, the innovation took almost a century to spread.

Kerosene. Also developed in the early decades of the 19th century, *kerosene* was another important fuel of illumination and cheaper than natural gas. Whales might have become extinct if it had not been for a series of events starting in Nova Scotia in 1846 that lead to the development of one of the most contentious and sought after products in the entire world. Abraham Gesner, a physician, invented a way to distill a combustible liquid he named *kerosene* that burned as clear, clean and bright as whale oil, and did not spoil over time (Bryson, 2010). His first source was from coal, the reason why some people called kerosene "coal oil" (see Footnote³³). When Edwin Drake found petroleum in Titusville, PA in 1859, "the immediate demand for kerosene [a by-product of the refining process] ushered in the age of oil" (Brox, 2010, p. 83) and "the beginning of the 'Kerosene Era' in which the slogan 'a lamp in every room' was realized (Miller & Solverson, 1992, p. 8).

The one big advantage over gas (and later electricity) was that kerosene fuel was far less costly to distribute. As a result kerosene oil became widely used by the 1860s. Safe, cheap, and abundant, the fuel was available to the general public and rivaled gas through the turn of the next century as the most popular source of reading and domestic lumination in millions of homes, particularly in small towns and rural areas.

Candle Advances. In the first major change in thousands of years, tallow candles were improved with the introduction of wax from the cavities of sperm whales in the late 18th century. In 1751, Benjamin Franklin wrote to Susanna Wright exclaiming the virtues of the whale tallow candle:

When I had the Pleasure of seeing you, I mention'd a new [kind of Candle very convenient] to read by, which I think you said you had not seen: I take the Freedom to send you a Specimen of them. You will find that they afford a clear white Light; may be held in the Hand, even in hot Weather, without softning (sic); that their Drops do not make Grease Spots like those from common Candles; that they last much longer, and need little or no Snuffing. (Franklin Papers, 1751)

New style table lamps were designed for multiple spermaceti wax candles such as the brass *Bouillotte Table Lamp*. Named for the French card game popular at the end of the 18th century, the lamp was fashioned to hold the game chips and prevent glare from the multiple candles as they burned down. With 2-4 candleholders and a metal shade, the top had a screw that allows one to move the shade down on a central shaft as the candles melted. As shown in Figure 197, the Bouillotte was advantageous for literary pursuits as well as recreational.

Oil Lamp Advances. Although candles were the major source of domestic lumination from 1780-1880, oil lamps were close in popularity, especially in America with the thriving whaling business. The first basic change in ancient oil lamps after literally millenniums and the "real

starting-point for rapid progress in the development of lighting appliances" (Robins, 1939, p. 109) was the invention of the *Argand Oil Burner* patented in 1780 in England by Aimé Argand (Figure 198). Only used by the more affluent, the lamp consumed considerably more fuel (first vegetable oil and then whale oil) and was made from bronze, silver, crystal, or other expensive materials. However, it literally increased the lighting

Figure 199. Dr. Leroy writing by a French Quinquet lamp



a power higher than ever before, producing the light equivalent to

> 6-10 candles because of a central chimney that increased the draft (thus oxygen) and a new kind of wick, that together with the better air flow, required less frequent snuffing. Another advantage was

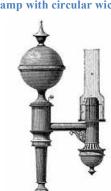


Figure 197. French Bouillotte lamp



Figure 198. Argand central glass chimney lamp with circular wick

the arm that allowed closer positioning of the light over the reading or writing materials as in Figure 199. To top that, the lamp was smokeless!

Figure 199 depicts Dr. Leroy (probably the obstetrician of the artist's wife) leaning on a volume of Hippocrates' *Morbi mulierum (The Diseases of Women)* and writing under the light of the French version of the central burner called a *Quinquet*. Although given credit

for the addition of the enclosed glass chimney (Robins, 1939), supposedly Antoine-Arnoult Quinquet (1745-1803), a pharmacist in Paris, copied the invention from his friend Argand and wrongfully claimed it in France under his name.

Figure 200 shows the Argand Table Lamp with a green transparent shade. Ironic as it sounds, the central burner fueled with whale oil gave *too* much light and required screening, too bright for most reader's eyes. "After so many centuries of dreaming of more light, people [had to] shield the flame.... These were the first lampshades" (Brox, 2010, p, 54).

Brilliance, however, came at a high price most could not afford. The increasing cost of refined sperm oil led to the use of the common man's grease or lard oil lamp, a version of the central burner with an upright wick. Popular from 1820-1850s, especially in America, they

Figure 201. Still Life with Book, Pipe, Lard Lamp and Match



were commonly made of tin, pewter or bras and had Figure 200. *The Elegant Reader* with an Argand lamp



cylinder forms on stems like candlesticks as seen in John Fredrick Peto's (1854-1907) still life representation in Figure 201. The match lying on the table beside it was another significant invention of the time period affecting literacy activities (see *Side Bar 16*).

On a literary note, Noah Webster (Figure 202) complied his two-volume *American Dictionary of the English Language* published in 1828, by the light of two tin lard oil lamps with a font that tilted to keep the wick in the oil and a corrugated metal reflector to increase the light (Clute, 1941). Figure 203 is a photo of one of these lamps.

Figure 202. Noah Webster



Figure 203. One of Webster's tin lard lamps with reflector



Gaslight Advances. Gaslight was the first reading light "without a wick. " How many people actually read/wrote by gaslight vs. oil lamps is difficult to tell. Gaslight's initial history and development was one of commercial and public and later personal and domestic use.

Figure 204. William Murdoch



The ""Father of Gaslight" was William Murdoch

(Murdock) (1754-1839), a Scottish engineer and inventor (Figure 204), who is credited with lighting the first domestic residence. He piped in natural gas to his own home in Redruth, Cornwall in 1792. Available domestically by the mid-1800s, illumination by gas was more of a middle-class phenomenon, as the poor could not afford gas and "the rich tended to distain it" (Bryson, 2010, pp. 123-124).

In addition to the infrastructure needed to get gas in homes and business, there were a number of drawbacks to gaslight:

headaches, nausea, blackened ceilings, greasy soot, discolored fabrics, and most of all, danger of explosion. Another disadvantage was that gas fixtures were not moveable, so readers or writers were restricted as to where they could work at night—a kerosene lamp was portable.

The wonderful thing about gas lighting, however, was that it was exceedingly brilliant, as much as 20 times brighter than any other luminate. As Bryson (2010) suggests,

...It [gas] provided wonderful overall illumination, making reading, card playing and even conversation most agreeable.... Book titles became discernible on their shelves. People read more. It is no coincidence that the mid-19th century saw a sudden and lasting boom in newspapers, magazines, books and sheet music. The

Lighting the Light

Many do not realize how recent an invention matches are in the scheme of human development. The safety match was not invented until the late 1800s.

Before that there were only a few ways to light an oil lamp or candle: sparks from (a) striking flint against iron (tinderboxes), (b) friction between hard or soft wood (firesticks); and (c) burning magnifiers. Last resort was the borrowed of an existing flame or coal.

James Boswell (1740-1795) in 1791 wrote that at 2:00 in the morning he inadvertently snuffed his candle while writing. He couldn't find a tinderbox, the firelight had gone cold and he finally had to depend on a watchman from the street to "relune" without danger about 3:00 AM.

Side Bar 16

number of newspapers and periodicals in Britain leaped from fewer than 150 at the start of the century to almost 5,000 at the end of it (p. 123).

Figures 205-206 depict the public and commercial nature of 19th century gas lighting and public institutional reading done by it. The first is an engraving of a nocturnal oral reading of scriptures in a poor house and the second is a painting by Richard Carlton





In the 1879 etching (Figure 207), Mary Cassatt (1844-1926) evoked the tranquility of domestic life using her mother and sister, Lydia, as models. One woman is reading, the other mending, both sharing the bright light of a table gas lamp—but, notably, not each other's space. Cassatt suffered eye disease that affected her painting, just as other famous artists mentioned earlier (see Footnote³⁴).

Figure 208 is a good example of artistic license and exaggerated lamp output. The widower with

the gas lamplight unnaturally illuminating the whole room has stopped reading his newspaper to listen to his daughter sing. She sounds so much like her mother. The work was exhibited with the lines from a Tennyson poem: "But O for the touch of a vanish'd hand/And the sound of a voice that is still" (see Tate Website, Figure 208).





Figure 208. *Her Mother's Voice* by Sir William Orchardson (1888)

<u>Click here to view</u> <u>image of Figure 208 at the</u> <u>Tate Collection, London.</u>

Woodville (1825-1855) showing gas piping snaking along the upper wall of an eating establishment. The arm going down the wall to the table connects to an unadorned flat flame burner. By the late 1800s, Murdock's invention saw its way into more affluent homes for domestic use as shown in Figures 207-208.

Figure 206. *Politics in an Oyster House* (with gas lighting fixtures)



Modern Lamp and Candle Advances.

We dreamed of the [kerosene] lamp which gives luminous life to dark matter.... The lamp [of petroleum] makes light ascend from the depths of the earth. (Bachelard, 1988, p. 66)

In the quest for better illumination, neither gas nor the Argand burner achieved the universality of the last major advance of the enhanced flame period of 1780-1880. The advent of kerosene initiated a revolution in artificial lighting during the Victorian Era with a profound social effect. For the general public (poor and rich alike), the dawn of petroleum brought a new cheap fuel for lamps and for candle making (paraffin) that superseded tallow from whales. The enduring draw and success of kerosene lamps was evident in the over 1600 patent applications for improvements filed through 1880 (O'dea, 1958).

The net result [of this lighting revolution] was a perfect oil lamp with a reservoir in the base of it, the fuel being fed to a circular or flat wick by capillary attraction and a draught-producing glass chimney to insure a clear, steady light. It was the to 19th century what indirect electric lighting is [was] to the 20th. (Clute, 1941)

Figure 209. The Smolensk Newspaper by Chagall (1914)



Kerosene (called petroleum in Europe) lamps usually burned as brightly as 5-14 candles (Brox, 2010, p. 82). They came in all shapes, sizes and forms— parlor lamps, table lamps, hanging area lamps, student desk lamps, floor lamps and sconces popular collector items today because of the beauty of their bases, oil containers, chimneys and shades.

Kerosene lamps pictured in paintings around the turn of the century suggest the lasting hold this artificial light source had

over gas lighting (and electricity) into the 20th century for both public and private venues. In an example of a common public literacy practice, Marc Chagall (1887-1985) depicted a café scene in which two men are discussing a newspaper article. A copy of the Russian *Smolensk Herald Newspaper* is the centerpiece of this celebrated scene painting (Figure 209). Lit by a circle of flickering greenish light from a kerosene lamp, the paper's headlines read *Voina* or *War*. The men sharing the news react differently; the younger on the left looks worried and disbelieving, the older on the right looks pensive and thoughtful.

Domestically, although one could read and do close work by the gas flame without eyestrain, people were hesitant to embrace the technology, many opting to keep their kerosene lamps to illuminate nightly domestic activities instead of installing gas in their homes. As pictured in this Pierre Bonnard (1867-1947) painting (Figure 210), a well of darkness and shadow engulf the family gathering. Yet with the shade forcing the light

Figure 210. Under the Light of the Lamp by Bonnard



Yet with the shade forcing the light down, there is an intimacy and togetherness under that warm soft yellow glow.

Around the turn of the century, the somewhat romanticized kerosene lamp became a frequently painted artifact by avant-garde artists of the Pointillism, Nabis, and Cubism movements. Their works give us varied and at the same time, magnificent examples of these lamps and how they were used in literate activities as shown in the next seven examples.

The Student Lamp. One hundred years after its invention, the Argand burner was adapted by German Adolph Kleeman to use cheap and plentiful kerosene. Sold by the thousands to the general public in the Victorian Era, it was known in America as the *Student (or Study) Lamp* or in Europe as the *Reading Lamp* (Figure 211). Generally a table model, the Student Lamps were not intended for area lighting, but instead for a smaller intimate area. Indeed, crafted specifically for reading and writing activities, they

were uniquely designed to minimize shadows and push the light downward onto the page for studying. "Most were adjustable in both its vertical height and its horizontal swing" (Miller & Solverson, 1992, p. 1). (See *Side Bar 17* for additional information.)

French pointillist Paul Signac (1863-1935) nicely pictured how the swing arm allowed the fuel reservoir to be out of the way so the page could go directly under the light for brighter

The Non-Explosive Lamp Company

One of the most popular American manufacturers of the Student Lamp was the Cleveland Company. Its well-known model was advertised as "The Best Study or Library Lamp in the World." The style could burn either gas or kerosene for as long as 9, 17 or 24 hours on one reservoir (Miller & Solverson, 1992, p. 22). With a name like "The Cleveland NON-EXPLOSIVE Lamp Company," who wouldn't want to buy a lamp from them?

Side Bar 17

reading or writing (Figure 212). In an unusual scene for the time, Figure 213 depicts a little girl multi-tasking—knitting and reading at the same time by the white light of her student lamp.

Figure 212. *Woman with Lamp* by Signac (1890)



Figure 211. Cleveland



Figure 213. Little Girl Reading and Knitting by llsted



The Rochester Lamp. Around 1883, American Charles Stanford Upton (1844-1897) helped light up the life of literates by inventing the Rochester Lamp, yet another improvement of the 100+ yearold central draft technology. Upton was an avid reader and spent many evenings with a good book and newspaper. According to Shilling (1993), Upton was dissatisfied

Figure 214. Rochester Lamp Advertisement



with the inadequate amount of light produced by the flat wick kerosene lamp and theorized that three or four wicks sewn together into a tube would give several times the light of the flat wick lamp. Teaming up with Leonard Henkle, a lamp maker, who patented the perforated thimble (a flame spreader), they invented the most popular and best-designed central draft lamp of the era (Figure 214). Revolutionizing the old kerosene lamp, "their amazingly successful venture brought artificial light to millions around the world for more than half a century" (Shilling, 1993). Advertised as the *Best Lamps on Earth* (see Footnote³⁵) in 1885, these lights survive today in the form of Coleman lanterns.

There are a number of paintings with the Rochester-like lamps around the turn of the century in which literacy is the focal point. Figure 215 is one particularly good example of a lone reader silently engrossed in a book, the glow from the oil table lamp illuminating the page surrounded in a shadowy night interior. The hanging kerosene lamp in Figure 216 provides wider area lighting for a family literacy scene that, among other reading practices, includes an oral reading lesson. Pablo Picasso, in one of his earliest works, portrays his friend, sculptor and author Joseph Cardona at his tiny desk in an intimate writing scene illuminated by the kerosene's yellowish glow (Figure 217).

Figure 215. *By Lamplight* by Harriet Backer (1890)

Figure 216. *The Reading Lesson* by Ekvall (1912)

Figure 217. Portrait of Joseph Cardona by Picasso (1899)



In more contemporary renderings, the collages of complex configurations of Cubists Pablo Picasso (1881-1973) and Juan Gris (1887-1927) and Surrealist Joan Miro (1893-1983) speak to the universality and everyday use of the kerosene oil lamps in the early 1900s (Figures 218-220).

Figure 218. Still Life with Skull, Book, and Oil Lamp by Picasso



Footnote ³⁶).

Figure 219. *Still Life* with an Oil Lamp by Juan Gris



Figure 220. *The Kerosene Lamp* by Joan Miro



Significantly, Brox (2010) christened kerosene lighting as "the last self-tended flame...the last open fire in the home " (p. 88-89).

the ancient oil lamp and its ancestors, the age-old servant

of literacy, finally succumbed to a higher form (see

We began the oil lamp's story thousands of years ago with stone artifacts and the juniper wick found deep in the caves of Lascaux and ended it in the modern age with kerosene lamps, "the last open flame" of artificial lighting. Ah, but like a beacon in the night (Figure 221),



Figure 221. Book Lighthouse by

Buchholz

Flameless Light Period (1880-present)

Fortunately, light without fire was our future. Nevertheless, in an attempt to stem the tide of the inevitable of flameless dominance, the Upton Rochester Lamp Company advertisement ran the following newspaper ad in the 1880s:

Electricity costs, one night, 60 Cents. 300 Candle [power] Rochester only costs, one night, 5 Cents (as cited in Shilling, 1993).

But never mind the cost difference, "electric lighting was ultimately irresistible. It was clean, steady, easy to maintain and available instantaneously in infinite amounts at the flick of a switch" (Bryson, 2010, p. 134).

The Early Years. Taming electric light, however, took several centuries of sporadic trial and error experiments. Albeit at a snail's pace when compared to the rate of advances today, readers/writers slowly transitioned through the early 20th century from dependence on the flicker of flames to the brilliance of the flameless incandescent light bulb. Just as with so many innovations, electric lighting started in the homes and businesses of the privileged and moneyed literates.

Benjamin Franklin (1706-1790) not only invented the bifocal, but also contributed mightily to the understanding of electricity with a corpus of written

works and experiments, one of which clarified that lightening and electrical charges were one and the same (Figure 222). His friend, artist Benjamin West (1738-1820), painted this posthumous portrait of him in 1816, portraying Franklin as a classical hero and

Figure 223. Craigside, Northumberland, UK: The first house to be wired with electricity



scientist discovering the lightening rod.

As to the actual invention, Sir Joseph Swan (1828-1914) was well ahead of Thomas Edison's (1847-1931) accomplishments. First introducing to the public his new electric incandescent light (albeit working only a few minutes) in Newcastle, England in 1879, Swan wired the world's first electrical home (as shown in Figure 223)—all before Thomas Edison (1847-19311) could accomplish anything of import in the field of electricity in America.

Figure 222. *Benjamin Franklin, Drawing Electricity from the Sky* (in an experiment of 1752)



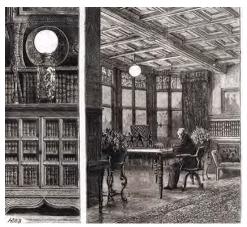
The owner of the first electrified house, Sir William Armstrong (1801-1900), a mechanical engineer and inventor, installed Swan's light bulbs at his home called

Craigside (Northumberland) in 1880. A newspaper illustration during that time (Figure the 224) showed him reading at night below one lamp of eight that he had installed in the very first study to have electricity. He used the brook on his property to make the electricity!

Figure 225. Thomas A. Edison (1890)



Figure 224. Sir William Armstrong reading by an electric lamp in his study.



Edison's "genius was organizing and producing electricity on a grand commercial scale" (O'Dea. 1958, p. 134) (Figure 225). I find it noteworthy that Edison first installed electricity in places that catered to very literate people and activities such as the New York Stock Exchange, the House of Commons in

London, and importantly, The New York Times building. In 1882, Times newspaper journalists came out unanimously in favor of electric over gas, saying that

It was a light that a man could sit down under and write for hours without the consciousness of having any artificial light about him.... The light was soft, mellow and grateful to the eye, and it seemed almost like writing by daylight to have a light without a particle of flicker and with scarcely any heat to make the

Figure 226. *The New Homestead*: Rural reading by electricity in the 1930s



headache. (as cited in Brox, 2010, pp. 122-123)

While the larger city populations had flameless lights early on, electricity only reached about 35 % of the American urban and suburban population by 1920. The last vestiges of oil lamps and candles did not disappear until the 1930s when President Franklin Roosevelt's New Deal made rural electrification a reality (Figure 226) (Brox, 2010). **Modern Times.** Today, hardly a modern literate activity (day or night) transpires in which some sort of electric power does not play a part—emailing, texting, e-book reading, word processing, publishing, even old fashioned book reading at night. The last vestiges of the old flame technology are the Coleman lanterns and candles, light sources for reading and writing for the most part relegated to outdoor camping and power outages (Figures 227-228).







Yet, like eyeglasses, electric lighting technology and associated artifacts have become so ubiquitous and accepted they are invisible to us and to painters. Electric lights are rarely pictured or featured as important artifacts in paintings since mid-century. Figures 229-230 are two early 20th century examples by Picasso and Rockwell. As modern oil lamps before them, shaded table and student lamps with flexible long arms or goosenecks seem the standard for brighter reading and writing experiences (Figures 231-232) in contemporary times.

Figure 229. *Reading at a Table* by Picasso (1934)

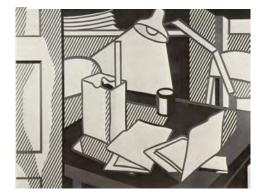


Figure 230. Detail from *And Daniel Boone Comes* to Life on the Underwood Portable by Rockwell (1923)



Figure 231. *Still Life with Lamp* by Roy Lichtenstein (1976)

Figure 232. *Barry (the Poet)* by Janet Fish (1982)





Yet contemporary readers still cling to lingering forms. The very artifacts of the ancients have had a huge renaissance in the 21st century. Fireplaces, oil lamps, and particularly candles are thriving businesses this century, not for reading and writing per se, but for decoration and mood setting.

Nationally known for her wonderful pastels representing reading and writing events, Deborah DeWit Marchant (b. 1956) characterized nicely in two paintings our relatively newfound literacy relationship with candles, firelight and electricity (Figures 233-234). Remarkably, Marchant's extensive oeuvre successfully includes many scenes of contemporary literacy in action. She feels she is successful as an artist when she can "capture what readers and writers feel" (DeWit Marchant, 2011). Indeed, she expertly pictures *situated literacy* at its best in the 21st century, depicting with feeling our literate Western world across different purposes, domains, habits, participants and beliefs and values.



Figure 233. Evenings at Home by Deborah DeWit Marchant

"

Figure 234. Friday Nights by Deborah DeWit Marchant



Summary and Conclusions

This completes the *painted story* of lens and light and how each has extended the life of readers into the night and into old age. For those who were condemned to a distressingly blurry world, and, indeed, a painfully dim one after sunset (even *with* oil lamps and candlelight), these inventions were a godsend for better sight of the written word.

What does this survey of paintings and literacy history tell us about the relationship of *lens, light and literacy*?

Above all, it underscores how the technological development of vision aids and artificial lighting was *driven by literacy*. Major turning points in reading/writing history include the (a) the gradual evolution from an oral to a written culture and subsequent change from reading out loud in groups to silent reading alone; (b) the invention of the printing press; (c) the 'reading revolution' at the end of the 18th century; and (d) the "industrialization of the book and advent of mass literary culture" beginning in the 1830s (Lyons, 2010, p. 10). The last three were particular watersheds of progress for artificial lighting and eyewear. With the resulting surges in literacy rates and access to more reading materials and books came increasing demand for better ways to "see and produce text" and rapid advances in vision enhancement and lighting tools.

What a long, long road it was, however, to keen eyesight and illumination for readers and writers! Thousands of years brought agonizingly slow development

- 1. From the ancient's mirror, glass globe, and reading stone, to the handheld single reading lens, quizzer, and monocle, and finally to nose-, temple-, and ear-fitting eyeglasses; and
- 2. From antiquity's open flame of firelight, burning brand, oil lamp and candle, to whale, kerosene and gas burners, and at last to the flameless electric light.

Nevertheless, the evolution of both lens and light defied linearity. Pince-nez spectacles popular in the early 20th century were throwbacks to the original bridge nose glasses

developed in the late 13th century. Roman oil lamps were more advanced than those used in the American colonies. The modern versions of the medieval handled magnifier and ancient domed reading stone are still in use today.

As institutions, Western religions, and especially the Catholic Church, were seminal in the development of eyewear, but did little to advance lighting technology. In fact ancient oil lamp and candle technology is still very much a part of ceremonial and ritualistic aspects of all three Western religions today, having very little to do with vision improvement.

Of course in most instances, the educated and the upper echelons of society benefited first, before the technologies of light and lens spread to the masses. Brox (2010) suggested, "As new forms of illumination [and vision aids] overtook the old, they competed with one another in ways that stratified society and intensified the separateness of countryside and city, household and industry" (p. 58)—including readers and non-readers.

While many vision and illumination challenges still remain in the 21st century (see Footnote ³⁷⁾, eyeglasses, artificial lighting, as well as literacy, are technologies (at least in the West) that have moved to the realm of the commonplace, the ubiquitous, the socially and culturally invisible. Whereas lens, light, and literacy belonged to the "special" over the centuries after their invention, they now reside with the everyday and mundane. The rarity with which contemporary artists paint literacy artifacts of lens and light or for that matter, people just reading and writing, suggest how commonplace they are in the modern world, their uniqueness being clearly a story of the past (see Footnote ³⁸).

In addition to a visual chronicle of the history of lens and light, what do the 200+ artistic works tell us about literacy practices?

A caveat is in order here. In paintings, we see *who* is using the written text and, to some extent, *how* they are interacting with them. We also get information about *what* is in the

picture and *when* and *where* the event took place, often suggested by the title, date and country of origin. However, the painting is a snapshot of a dynamic process frozen in time (a visual bite, so to speak) and we can only speculate as to the subtext (the implicit or metaphorical meaning).

Within these limitations and others (see Footnotes ^{39 and 40}), the artistic representations of lens and light across the centuries bring to life a broad array of clearly changing literacy practices. The sampling of artistic works here reflect a definitive microcosm of a larger corpus of some 9000 literacy paintings (identified to date) that portray reading and writing acts and associated artifacts (Figures 1-6). Through artists' eyes we can see and document varying purposes, domains, habits, participants; and values/beliefs

Figure 235. *Rhetoricians at a Window* by Jan Steen (1662)



as to what it meant to be literate—indeed, *situated literacies*: the context giving meaning to behaviors in a long line of unique snapshots of periods, places and people.

As to *why people read and wrote*, this historical survey suggests that religious devotional intent (Figure 73, 81), enlightenment (Figure 61) or Biblical scholarship (Figures 17, 18, 66, 147) were paramount, particularly from medieval times through the 17th century when more secular purposes abounded such as communication through letter writing (Figure 149), universal public education (Figure 138) and personal academic and professional pursuits (Figures 126, 148, 188). While we think of leisure reading as a modern phenomena, paintings actually showed reading for pleasure gained prominence in the Dutch genre movement of the 1600s with dramatic scenes of light and shade involving group amusements of merry-making, drink and music (Figure 189 with artificial light and Figure 235 with natural light).

As to *how people read and interacted with text*, the many art works bare out humankind's slow evolution from an oral to a silent print culture. Scenes of reading aloud in groups (Figures 61, 65, 74, 152, 194) were popular through the 19th century. (See Dowhower, 2006, for a survey of oral reading paintings). Although images of solitary figures lost in a book (Figures 140,148), particularly philosophers studying or monks meditating, appeared in the 1600s, it is often difficult to tell if they are reading aloud or to themselves. Not until the beginning of the 20th century can we infer from the images with some confidence that silent reading was the preferred modality (Figures 229 and 230).

As to *the actual readers/writers*, artists painted, for the most part, those who had "social, cultural and economic capital." Not surprisingly, men in general were the most advantaged and were pictured as the immediate recipients of the new inventions to improve sight of written text.

From the early Christian era, only male biblical characters and saints were shown reading and writing by artificial light—and even anachronistically with glasses from the late 1300s. By the latter part of the 11th century famous real-life clergy and aristocracy reading by the light of candles or lamps (such as Sabas and the Emperor in Figure 180) began appearing in manuscript illuminations; and of course by the mid 1300s, Tommaso painted his famous fresco with the first representation of spectacles on the nose of a monk that died 22 years before they were invented (Figure 62). Males were the first to be pictured using single reading lenses (Figures 28-32), head and cap spectacles (Figure 82), quizzers and monocles, and purchasing double or single lenses at public vendors in the early 1500s (Figure 116).

If the number of paintings is any indication, women, for the most part, were disenfranchised from the reading/writing process and optical tools for centuries. As with spectacles (Figures 80, 81), there are no significant paintings of women (including saints) reading at night until first quarter of the 17th century; Gerrit van Honthorst's (1592-1656) superb rendering of an *Old Woman Examining a Coin by Lantern* (1623) being one of the first (Figure 236) and doubly significant to this discussion since the picture has early representations of *both* bow wire spectacles and candlelight.

Artificial lighting associated with women reading became extremely popular at the end of the 19th century, a result of the wave of fascination with the female sex by artists who portrayed them in scores of paintings romantically enjoying books in softly lit domestic interludes (Figures 210, 212, and 215), as well as lush shaded outdoor scenes (Figure

144). As to eyewear, old prejudices have carried over from centuries of generally negative attitudes about bespeckled females. Females, even today, rarely are pictured wearing glasses in artistic works (as well as photographs) and when they are, the women are usually older (Figures 131,150).

Perhaps the most revealing, is tracing the threads of literacy practices through the venues *where people read and wrote* over the ages. The dynamic changes across settings suggested the ever-expanding nature of literacy from the advantaged to the masses, the religious to the secular, and public to domestic domains.

The first literacy settings depicting artificial light sources were the early medieval scriptoriums of the Evangelists (Figure 168) who composed at elaborate Figure 236. *Woman Examining a Coin by Lantern* (1623) by Honthorst



desks scattered with writing instruments. These scenes slowly transformed into the singular monastic cells of the late Middle Ages with mirrors and lenses (Figures 18, 29, 62) and the cluttered scholar's study of the Renaissance and Baroque periods (Figures 19, 164, 166, 199); finally morphing into the modern book-filled study of the 20th century (Figures 121, 122, 217) and the contemporary office of today (Figure 232).

Other than religious scriptorium scenes of reading and writing, those in actual churches were rare until the 1300s, first appearing in illuminated manuscripts (Figures 64, 65, 169, 181). The education of the clergy and the aristocracy at universities and church schools (Figure 179) was a particularly common scene in miniatures of this time, mirroring the rise of higher educational institutions in France, Italy and England. Dutch popularization of genre scenes of *peasant* schools in the mid-1600s showed literacy as an educational tool in the every daily life of the masses (Figure 138) for the first time.

The Flemish and Dutch art of the mid-1600s also was important in the initial depiction of literacy in domestic interiors (Figure 149), themes of which were later repeated in the idealized portraits of women and family life reading by the firelight, candle or lamp of the late 19th and early 20th centuries. Images of shared literacy in public eateries and cafés in the mid-to-late 19th century (Figures 51,194, 206 and 208) pointed to the rising distribution of alternative forms of information such as broadsheets, newspapers and magazines and underscored reading aloud as a secondary yet enduring modality (Dowhower, 2006).

Pope Gregory in the 6th century CE argued the didactic function of Christian narrative art saying that "the image was for simple men what the word is to those who can read." In 1025, the Synod of Arras supported this view, decreeing "illiterate men can contemplate in the lines of a picture what they cannot learn by means of the written word" (as cited in

Kypiotis, 2010). Isn't it ironic that for literates in this day and age, "the lines" of paintings have important stories to tell about the history of literacy and its artifacts, ones that cannot be "learned" or gleaned altogether from the written word?

References

- Alan. (2008, January 24). Re: Fact: Not everyone can wear pince-nez. Pince-Nez Renaissance [Web log comment]. Retrieved from http://pincenez1.blogspot.com/2008/01/fact-not-everyone-can-wear-pincenez.html
- Alan. (2010, April 6). Re: Who wore pince-nez? *Pince-Nez Renaissance* [Web log comment]. Retrieved from <u>http://pincenez1.blogspot.com/2010/04/who-wore-pince-nez.html</u>
- Ambrose, S. E. (1991). *Eisenhower: Soldier and president*. New York: Simon and Schuster.
- Andressen, B. M. (1998). Brillen: Vom gebrauchsartikel zum kultobjekt / Spectacles: From utility article to cult object. Stuttgart: Arnoldsche Art Publishers.
- Ascaso, F. J. & Bosch, J. (2010). Uveitic secondary glaucoma: Influence in James Joyce's (1882-1941) last works. *Journal of Medical Biography*, 18, 57-60. doi: 10.1258/jmb.2009.009064
- Avrin, L. (1991). Scribes, script and books: The book arts from antiquity to the *Renaissance*. Chicago: Art Library Association; London: The British Library.
- Bachelard, G. (1988). *The flame of a candle* (J. Caldwell, Trans.). TX: Dallas Institute Publications.
- Baron, D. (1999). From pencils to pixels: The stages of literacy technology. In G. E. Hawisher and C. Selfe, (Eds.), *Passions, pedagogies and 21st century technologies* (pp. 15-33). Logan, UT: Utah State University Press; Urbana, IL: NCTE.
- Barton, D., Hamilton, M., & Ivanic, R. (2000). *Situated literacies: Reading and writing in context.* New York: Routledge.
- Beckett, S. W. (1998). Sister Wendy's book of saints. London: Dorling Kindersley.
- Beyer, A. (2003). *Portraits: A history* (S. Lindberg, Trans.). New York: Harry N. Abrams.
- Boehm, B. D. (1994). The books of Florentine illuminators. In *Painting and illumination* in early Renaissance Florence 1300-1450 by Kanter, L. B., Boehm, B. D., Strehlke, C. B., Freuler, G., Thruman, C. C. M., & Palladino, P. New York: Metropolitan Museum of Art, Harry Abrams distributor.
- Boehm, M. (2006, December 16). 'Blinking Sam' to be in full view. Los Angeles Times. Retrieved from <u>http://articles.latimes.com/2006/dec/16/entertainment/et-blinking16</u>
- Boyer, S. (2005). Retrieved from <u>http://www.louvre.fr/llv/oeuvres/detail_notice.jsp?CONTENT%3C%3Ecnt_id=10</u> <u>134198673225680&CURRENT_LLV_NOTICE%3C%3Ecnt_id=101341986732</u>
 - 25680&FOLDER%3C%3Efolder_id=9852723696500828&baseIndex=138&bmL ocale=en

- Boyle, B. M. (2002). *Early lighting 2 in America: Betty lamps and grease lamps*. Retrieved from Rams Horn Studio website: http://www.ramshornstudio.com/early_lighting_2.htm
- Brands, H. W. (2005). Andrew Jackson: His life and times. New York: Doubleday.
- Brox, J. (2010). *Brilliant: The evolution of artificial light*. New York: Houghton Mifflin Harcourt.
- Bryson, B. (2010). At home: A short history of private life. New York: Doubleday.
- Budgen, F. (1934/1967). James Joyce and the making of Ulysses (4th ed.). Bloomington: Indiana University Press.
- Burckhardt, J. (1947). Rembrandt and Van Dyke: Zwei vorträge. Bern: A. Scherz.
- Chaplin, J. E. (2006). *The first scientific American: Benjamin Franklin and the pursuit of genius*. New York: Basic Books, Perseus Book Group.
- Clute, E. (1941, September). Flashback: Lamps and illuminants. *American Collector Magazine*. Retrieved from <u>http://www.collectorsweekly.com/articles/lamps-and-</u> <u>illuminants/</u>
- College of Optometrists. (2011). *Rivet spectacles*. Retrieved from The MusEyeum Online Exhibition Spectacle Gallery, British Optical Association Museum website: <u>http://www.college-optometrists.org/en/knowledge-</u> centre/museyeum/online_exhibitions/spectacles/rivet.cfm
- College of Optometrists. (2011a). *Everybody dies*. Retrieved from The MusEYEum On-line Exhibition Art Gallery, British Optical Association Museum website: <u>http://www.college-optometrists.org/en/knowledge-</u> centre/museyeum/online_exhibitions/artgallery/memento.cfm
- College of Optometrists. (2011b). *A curtain fell upon him*. Retrieved from The MusEYEum On-line Exhibition Art Gallery, British Optical Association Museum website: <u>http://www.college-optometrists.org/en/knowledge-</u> centre/museyeum/online exhibitions/artgallery/reynolds.cfm
- College of Optometrists. (2011c). *Antiques in use*. Retrieved from The MusEYEum On-line Exhibition Art Gallery, British Optical Association Museum website: <u>http://www.college-optometrists.org/en/knowledge-</u> centre/museyeum/online_exhibitions/artgallery/antiques.cfm
- College of Optometrists. (2011d). *The 'inventor' of bifocals?* Retrieved from The MusEYEum On-line Exhibition Art Gallery, British Optical Association Museum website: <u>http://www.college-optometrists.org/en/knowledge-</u> centre/museyeum/online exhibitions/artgallery/bifocals.cfm
- Corson, R. (1967). Fashions in eyeglasses. London: Peter Owen.
- Crestin-Billet, F. (2004). Collectable eyeglasses (J. Sty, Trans.). Paris: Flammarion.
- Danielsson, B. (1966). Gauguin in the south seas. Garden City, NY: Doubleday.
- Davidson, D. C. & MacGregor, R. J. S. (2002). Spectacles, lorgnettes and monocles. Buckinghamshire, UK: Shire Publication, Ltd.
- Davies, D. (2003). *El Greco*. NY: Metropolitan Museum of Art; London: National Gallery.
- Daxecker, F. (1997). Representations of eyeglasses on Gothic winged altars in Austria. Documenta Opthalmologica, Advances in Ophthalmology, 93 (1-2), 169-188.
- De Beaune, S. A., & White, R. (1993). Ice age lamps. *Scientific American Monthly*, 266(3), 108-113.

De Hamel, C. (1986). A history of illuminated manuscripts. London: Phaidon Press.

- De Rynck, P. (Ed.). (2004). *How to read a painting: Lessons from the old masters*. New York: Harry N. Abrams.
- DiLaura, D. L. (2006). A history of light and lighting: In celebration of the century of the Illuminating Engineering Society of North America. New York: Illuminating Engineering Society of North America.
- DeWit Marchant, D. (2011, November 11). Personal communication.
- Dowhower, S. L. (2006). Painted literacy: Reading aloud rituals. *American Reading Forum Yearbook*. Retrieved <u>http://www.americanreadingforum.org/yearbook/yearbook/06_yearbook/volume</u> 06.htm#Dowhower
- Drewry, R. D. (2007). *History of glasses: What man devised that he might read*. Retrieved from Teagle Optometry Website: http://www.teagleoptometry.com/history.htm
- Ebert-Schifferer, S. (1999). Still life: A history. New York: Harry N. Abrams, Inc.
- Ellmann, R. (1982). James Joyce (2nd ed.). Oxford: Oxford University Press.
- Enoch, J. M. (1998, April). The enigma of early lens use. *Technology and culture*, 39(2) 273-291. Enoch, J. M. (2007, May-June). Archeological optics: The very first known mirrors and lenses. *Journal of Modern Optics*, 54 (7-9), 1221-1239.
- Enoch, J. M. (2006). History of mirrors dating back 8000 years. *Optometry and Vision Science* 83(10), 775-781.
- Enoch, J. M. (2007, May 10-June 15). Archeological optics: The very first known mirrors and lenses. *Journal of Modern Optics*, 54(7-9), 1221-1239.
- Enoch, J. M. (2009). The fascinating early history of optics! Archaeological Optics 2009; our knowledge of the early history of lenses, mirrors and artificial eyes! Invited Paper [7428-02]. Proceedings-spie the International Society for Optical Engineering, 7428 742803 British Library Series. doi:10.1117/12.828453
- Eshleman, C. (2003). Juniper fuse: Upper Paleolithic imagination and construction of the underworld. Middletown, CT: Wesleyan University Press.
- Eyeglasses. (2011). In *Thomas Jefferson Encyclopedia*. Retrieved from The Jefferson's Monticello website: <u>http://www.monticello.org/site/research-and-</u>collections/eyeglasses#
- Fischer, S. R. (2003). A history of reading. London: Reaktion Books.
- Fleishman, D. A. (2011). Antique Spectacles and Other Vision Aids. *The On-Line Museum and Encyclopedia of Vision Aids*. Retrieved from <u>http://www.antiquespectacles.com/</u>
- Fleishman, D. A. (2011a). *Eyeglasses through the ages*. Retrieved from the Antique Spectacles and Other Vision Aids website: http://www.antiquespectacles.com/history/ages/through the ages.htm
- Fleishman, D. A. (2011b). *Rivet spectacles—The earliest style*. Retrieved from the Antique Spectacles and Other Vision Aids website:

http://www.antiquespectfleishacles.com/rivet_spectacles/rivets.htm

Fleishman, D. A. (2011c). *Kloster Wienhausen*. Retrieved from the Antique Spectacles and Other Vision Aids website:

http://www.antiquespectacles.com/topics/wienhausen/wienhausen.htm

- Fleishman, D. A. (2011d). *The Edward Scarlett trade card*. Retrieved from Antique Spectacles and Other Vision Aids website: http://www.antiquespectacles.com/trade_cards/scarlett/scarlett.htm
- Fleishman, D. A. (2011e). *Benjamin Martin and his visual glasses*. Retrieved from Antique Spectacles and Other Vision Aids website: http://www.antiquespectacles.com/topics/martin/martin.htm
- Fleishman, D. A. (2011f). *Benjamin Franklin—Father of the bifocal*. Retrieved from Antique Spectacles and Other Vision Aids website: http://www.antiquespectacles.com/topics/franklin/franklin.htm
- Fleishman, D. A. (2011g). Scarlet focus mark at *The slide show of interesting associated images* at Antique Spectacles and Other Vision Aids. Photo retrieved from http://www.antiquespectacles.com/trade cards/associated.htm
- Franklin Papers. (1751, November, 21). Letter to Susanna Wright: Volume 4. Digital Edition of the Papers of Benjamin Franklin, American Philosophical Society and Yale University website: Retrieved from http://www.franklinpapers.org/franklin/framedVolumes.jsp
- Franklin Papers. (1771, July 17). Letter to Jane Franklin Mecom: Volume 18. Digital Edition of the Papers of Benjamin Franklin, American Philosophical Society and Yale University website: Retrieved from http://www.franklinpapers.org/franklin/framedVolumes.jsp

Franklin Papers. (1784, August 21). Letter to George Whatley: Volume 37, unpub. 1784-85. Digital Edition of the Papers of Benjamin Franklin, American Philosophical Society and Yale University website: Retrieved from http://www.franklinpapers.org/franklin/framedVolumes.jsp

- Franklin Papers. (1785, May 23). Letter to George Whatley: Volume 37, unpub. 1785-86. Digital Edition of the Papers of Benjamin Franklin, American Philosophical Society and Yale University website: Retrieved from http://www.franklinpapers.org/franklin/framedVolumes.jsp
- Frugoni, C. (2003). Books, banks, buttons. New York: Columbia University Press.
- Getty (2007). Radiant darkness: The art of nocturnal light. Past exhibition at the Getty Center, April 24-July 22, 2007. Retrieved from the J. Paul Getty Museum website: http://www.getty.edu/art/exhibitions/radiant_darkness/
- Gibbs, R. (1989). Tomaso da Modena: Painting in Emilia and the March of Treviso, 1340-80. New York: Cambridge University Press.
- Gilbert, S. (Ed.). (1957). Letters of James Joyce. New York: Viking Press.
- Gowing, L. (Ed.). (1995). A history of art. New York: Barnes & Noble.
- Gurewitsch, M. (2009, March). Jan Lievens: Out of Rembrandt's shadow. *Smithsonian Magazine*. Retrieved from <u>http://www.smithsonianmag.com/arts-culture/Out-of-Rembrandts-Shadow.html</u>
- Haas, C. (1996). *Writing technology: Studies on the materiality of literacy*. Mahwah, NJ: Lawrence Erlbaum Associates.
- Hall, J. (1979). *Dictionary of subjects and symbols in art* (revised ed.). Boulder, CO: Westview Press
- Hamilton, R. (2000). Expanding the new literacy studies: Using photographs to explore literacy as social practice. In D. Barton, M. Hamilton, & R. Ivanic (Eds.),

Situated literacies: Reading and writing in context (pp. 16-33). New York: Routledge.

- Handley, N. (2005, October 28). What is an Optician? What's in a name? Proceedings of the British Royal Literary and Scientific Institution, Vol. 10 (2006). Retrieved from http://www.brlsi.org/proceed06/science281005.htm
- Handy, M. P. (1876). Confederate make-shifts. In *Harper's Magazine: Making of America project: Vol. 52*, (pp. 576-580) [Google eBook]. Retrieved from http://books.google.com/books?id=pOYvAAAAMAAJ&printsec=frontcover&so urce=gbs_ge_summary_r&cad=0#v=onepage&q&f=false
- Hapgood, H. (1900). Abraham Lincoln: The man of the people. New York: Macmillan.
- Hemingway, V. (2004). *Running with the bulls: My years with the Hemingways*. New York: Ballantine Books.
- Hern, C. (2004, June 1). *Quizzing glasses*. Retrieved from http://www.candicehern.com/collections/04/eyeglass.htm
- History of Candles. (2010). Retrieved from National Candle Association website: http://www.candles.org/about_history.html
- Holtmann, H. W. (1980). A short history of spectacles. In W. Poulet, Atlas of the history of spectacles (pp. vii- xxi). Bonn: Wayenborgh.
- Hough, W. (1902/1992). *The development of illumination*. Washington DC: Government Printing Office and Rushlight Club.
- Hustvedt, S. (2005). *Mysteries of the rectangle: Essays on painting*. New York: Princeton Architectural Press.
- Hyman, L. (2007, July-August). Myopic and hyperopic refractive error in adults: An overview. *Ophthalmic Epidemiology*, 14(4), 192-197. doi: 10.1080/09286580701535517
- Ilardi, V. (2007). *Renaissance vision from spectacles to telescopes*. Philadelphia, PA: American Philosophical Society.
- Irving, W. (1854). *The works of Washington Irving*, Vol. XI. Oliver Goldsmith. New York: G. P. Putnam.
- Isaacson, W. (2003). *Benjamin Franklin: An American life*. New York: Simon & Schuster.
- Kaplan, R. M. (2008, August). Doctors, disease and James Joyce. *Australian Family Physician*, 37(8), 668-9.
- Kelley, A. (1978). *Lenses, spectacles, eyeglasses, and contacts: The story of vision aids.* New York: Thomas Nelson Inc.
- Kellsey, C. M. (1999). Lecto divina: Nuns and reading in the sixth and seventh centuries (Master's thesis). Retrieved from Jan Jose State University SJSU ScholarWorks: http://scholarworks.sjsu.edu/etd_theses/1934/
- Klawans, J. (2010, March 31). Was Jesus' last supper a seder? *The Christianity*. Retrieved from <u>http://thechristianity.wordpress.com/2010/03/31/was-jesus%E2%80%99-last-supper-a-seder/</u>
- Kosters, B. (2010, May 27). Interview with Chuck Close. *F Newsmagazine*. School of the Art Institute of Chicago. Retrieved from http://fnewsmagazine.com/wp/2010/05/interview-with-chuck-close/
- Kypiotis, L. (2010, June). *To see...catalogue essay*. Retrieved from the Pilgrim Project
 - website: <u>http://www.thepilgrimproject.org/?p=472</u>

- Leaves of Gold. (2011). Book of Hours for Sarum Use and Gallican Psalter with Canticles (Pembroke Hours). Treasures of manuscript Illumination from Philadelphia Collections. Retrieved from http://www.leavesofgold.org/gallery/psalters/psalter09.html
- Lipson, N. (2008, February). One of mankind's greatest inventions. *Mivision*, 20-21. Retrieved from

www.antiquespectacles.com/newsworthy/pdf files/feb 2008 mivision.pdf

- Literary Clubs in the US. (2009, January 12). Retrieved from the Indianapolis Literary Club website: <u>http://www.literaryclub.org/id18.html</u>
- Livingstone, M. S. & Conway, B. R. (2004, September 16). Was Rembrandt stereoblind? *New England Journal of Medicine*, 351, 1264-1265.
- Louvre. (2003, October 1). Paintings: Latest Acquisitions: Saint Jerome meditating by Jan Cornelisz Vermeyen.

http://www.louvre.fr/llv/oeuvres/detail_actualite.jsp?CONTENT%3C%3Ecnt_id= 10134198673211764&CURRENT_LLV_FICHE%3C%3Ecnt_id=101341986732 11764&FOLDER%3C%3Efolder_id=9852723696500764&bmLocale=en

Luckiesh, M. (1920). Artificial light. New York: The Century Co.

- Lyons, M. (2010). A history of reading and writing: In the western world. New York: Palgrave Macmillan.
- Macfarlane, A. & Martin, G. (2002). *Glass: A world history*. Chicago: University of Chicago Press.
- Maddox, B. (1988). Nora: The real life of Molly Bloom. Boston: Houghton Mifflin.
- Manguel, A. (1996). A history of reading. New York: Penguin Books.
- Marmor, M. F. & Ravin, J. G. (2009). *The artist's eyes: Vision and the history of art.* New York: Abrams.
- Martin, G. D. (2007). *Tefillin (phylacteries)*. Retrieved from <u>http://aoal.org/bt/tefillin.html</u>
- Meiss, M. (1970). *The great age of fresco: Discoveries, recoveries and survivals.* New York: George Braziller in association with The Metropolitan Museum of Art.
- Mellby, J. L. (2008, November 12). Palatino's tools of handwriting. *Graphic Arts*, 1-3. Online publication by Princeton University Library. Retrieved from <u>http://blogs.princeton.edu/graphicarts/2008/11/palatinos_tools_of_handwriting.ht_ml</u>
- Meyers, J. (1985). Hemingway, a biography. New York: Harper & Row.
- Miller, R. C. & Solverson, J. F. (1992). *Student lamps of the Victorian era*. Marietta, Ohio: Antique Publications.
- Mitchell, R. (1969). *The study book of lamps and candles: The history of lighting*. London: Bodley Head.
- MusEYEum News 2 (2010, March 15). The man who wouldn't wear his spectacles. Vol. 1(2), 2. Online publication retrieved from the College of Optometrists website: http://www.college-optometrists.org/en/utilities/documentsummary.cfm/docid/0FB0E4BE-3048-216E-80888678A3AC5591
- O'Dea, W. T. (1958). *The social history of lighting*. London: Routledge and Kegan Paul.
- Old Time Lamp Shop. (2007). *Betty lamps*. Retrieved from http://collectlamps.com/fat%20betty%20lamps.html

Orr, H. (1985). Illustrated history of early antique spectacles. Kent, UK: Beckenham.

- Page, D. (2010, September 14). Notes on the text *From Sea to Sea* (March-September, 1889) by R. Kipling. Footnote, p. 446, line 15. Retrieved from http://www.kipling.org.uk/rg seatosea twentyone.htm
- Perry, D. H. (1969). *Out of darkness: A history of lighting*. Rochester, NY: Rochester Museum and Science Center.
- Pliny the Elder (C. 77 CE). *The Natural History*, Book XXXVII, Chapter 10. J. Bostock & H. T. Riley, Esq. (2010) available in print. Retrieved from http://www.perseus.tufts.edu/hopper/text?doc=Perseus%3Atext%3A1999.02.0137 %3Abook%3D37%3Achapter%3D16
- Poulet, W. (1980). Atlas of the history of spectacles. Bonn: Wayenborgh.
- Robins, F. W. (1939). *The story of the lamp (and the candle)*. London: Oxford University Press.
- Rosen, E. (1956). The invention of eyeglasses. *Journal of the History of Medicine and Allied Science*, 11(1), 13-46; 182-218.
- Rosenthal, J. W. (1996). Spectacles and other vision aides: A history and guide to collecting. San Francisco: Norman Publishing.
- Sambrook, J. (2009, February). Club (*act.* 1764–1784). *Oxford Dictionary of National Biography*, Oxford University Press online edition. http://www.oxforddnb.com/public/themes/49/49211.html
- Saywell, D. & Simon, J. (2004). *Complete illustrated catalogue, National Portrait Gallery*. London: National Portrait Gallery.
- Schneider, N. (1999). *Still life: Still life painting in the early modern period*. New York: Taschen.
- Sellers, C. C. (1962). *Benjamin Franklin in portraiture*. New Haven: Yale University Press; American Philosophical Society.
- Sheehan, G. (2004, April 6). Kipling and Medicine: Neurological Conditions, Kipling's eyesight problems. Retrieved from http://www.kipling.org.uk/rg_kipmedicine_1.htm
- Shilling, D. A. (1993, December). How Rochester lamps helped light up the world. *The Crooked Lake Review*. Retrieved from http://www.crookedlakereview.com/articles/67 100/69dec1993/69shilling.html
- Smith, F. (1988). Joining the literacy club. Portsmouth, NH: Heinemann.
- Spectacles and Sunglasses. (2005). Amsterdam: Pepin Press.
- Temple, R. (2000). *The crystal sun: Rediscovering a lost technology of the ancient world.* London: Century.
- Thomas Jefferson Papers. (1806, December 1). Letter and bill from John McAllister to Thomas Jefferson. Retrieved from Library of Congress website" http://hdl.loc.gov/loc.mss/mtj.mtjbib016628
- Thomas Jefferson Papers. (1806, November 12). Letter from Thomas Jefferson to John McAllister. Retrieved from Library of Congress website: http://hdl.loc.gov/loc.mss/mtj.mtjbib015576
- Thomas Jefferson Papers. (1808, November 16). Letter from Thomas Jefferson to John McAllister. Retrieved from Library of Congress website: http://hdl.loc.gov/loc.mss/mtj.mtjbib019310
- Thomas, J. (2000). Victorian narrative painting. London: Tate Publishing.

- Thornton, D. (1997). *The Scholar in his study: Ownership and experience in Renaissance Italy.* New Haven: Yale University.
- Totty, M. (2010, September 28). A different kind of eyeglasses. *Wall Street Journal*. Retrieved from <u>http://nbsrocks.com/a-different-kind-of-eyeglasses</u>
- Tusting, K., Ivanic, R., & Wilson, A. (2000). New literacy studies at the interchange. In D. Barton, M. Hamilton & R. Ivanic (Eds.), *Situated literacies: Reading and writing in context* (pp. 210-218). New York: Routledge.
- V&A. (2011). *Medieval monasteries*. Retrieved from the Victoria and Albert Museum website: <u>http://www.vam.ac.uk/content/articles/m/medieval-monasteries/</u>
- White, T. (2007, April 11). Eye diseases changed great painters' vision of their work later in their lives. *Stanford Report*. Retrieved from http://news.stanford.edu/news/2007/april11/med-optart-041107.html
- Willach, R. (2008). *The long route to the invention of the telescope*. Philadelphia: American Philosophical Society.
- Windsor Eyeglasses. (2011). Retrieved from the Eyeglassess Warehouse website: http://www.eyeglasseswarehouse.com/pages/windsor.html
- Wong, T. (2010, November 28). *The remediation of the visual* [Web log post]. Retrieved from ETEC540: Text Technologies website:
- http://blogs.ubc.ca/etec540sept10/2010/11/28/the-remediation-of-the-visual/

Wood, G. S. (2004). Americanization of Benjamin Franklin. New York: Penguin Press.

World Lingo. (2011). Mauritius Rotunda. Original Wikipedia article in German and retrieved from <u>http://de.wikipedia.org/wiki/Mauritiusrotunde</u> Translation retrieved from Multilingual Archive and World Lingo website at <u>http://www.worldlingo.com/ma/dewiki/en/Mauritiusrotunde#Weblinks</u>

Footnotes

³ Fleishman suggests that some experts think this actually may be a pharmacist's trowel instead of a single lens; while others, like Willach (2008) contend that it is the first extant dioptrical correction aid representation. For Fleishman's comment click on the pharmacist image at

http://www.antiquespectacles.com/slide shows/non vision aids/nva.htm#

⁴ The first major shift in magnification technology for reading and writing came in the late 20th century with the computer and digital revolution in which the size of print could be manipulated by changing the font or letter size. Perhaps even more revolutionary is the 21st century's *touch technology* where double tapping, finger stretching, and virtual magnifying enlarge the letter sizes for easy viewing on small handheld devices like smart phones, iPods, and iPads.

⁵ The oldest painting I have been able to find of a hand magnifier is one pictured among alchemist's tools in a miniature from a French 14th illuminated manuscript, *The*

¹ Martin's (2007) work suggested the actual use of magnifying devices in ancient

² The British Museum originally identified this as a "magnifying glass" (not a mirror) on its website. Based on the lack of archeological evidence of transparent magnifying lens this size or any known paintings of them in this time period, I believe Beauvais is using a magnifying "mirror," much like that of St. Isnardo.

Book of Abraham, the Jew, attributed to Nicolas Flamel (1330-1418), Paris, Bibliotheque Nationale de France, MS. Fr. 14765, fol. 1.

⁶ Often a contemporary reader will require three different vision prescriptions; one for close reading, one for medium distance as with a computer screen, and another for print far away. One modern solution has been trifocals —another more recent is Superfocus Glasses (see Footnote 37).

⁷ The only Italian pair of rivet spectacles ever found was from Florence. The artifact is made of thin bone and is medium brown in color. An image can be seen at the Antique Spectacles and Other Vision Aids website:

http://www.antiquespectacles.com/rivet_spectacles/rivets.htm

⁸ Originally the Salisbury nuns at the Church of St. Martin lived under Roman Catholic Cistercian rule until the 16th century when the convent converted to Protestantism.

⁹ Two known paintings exist with spectacles associated with women saints: (a) St. Anne was pictured with nose eyeglasses in her lap on a book in *The Holy Kinship* by Geertgen tot Sint Jans at the Amsterdam Kijksmuseum; however, the spectacles were not in the original of 1475 and were subsequently removed from the painting upon recent restoration; and (b) St. Mary was depicted with the same spectacle type resting behind her prayer book on a shelf in *The Annunciation* by Juame Huguet painted sometime during the second part of the 15th century (Museo Diocesano de Tarragona, Spain).

¹⁰ *The Golden Legend* is a collection of tales of the saints by Dominican cleric Jocabus de Voragine (1228/9-1298). An important source for Christian iconography since the Middle Ages, artists have borrowed liberally from this 13th century book.

¹¹ Sometimes the figure of Jesus is included holding Mary's soul. A younger John is often given prominence since he was charged to care for the Virgin. Peter usually stands over Mary, holding an open book from which he is administering Holy Communion. If she is still alive, the Virgin may hold a lighted candle to symbolize the Christian faith (Hall, 1979).

¹² Two other works during the same time period show an apostle using spectacles as a magnifier: *Death of the Virgin* (c. 1500) by Maestro De L Sisla at Museo del Prado in Madrid and *Death* (1475) by Martin Schongauer at the British Museum, London.

¹³ I have had trouble confirming this claim. The image cited by Manguel is the very same *Death of Mary* scene on the Albrecht Altarpiece, one of 22 panels of the life of Mary by the Albrecht Master executed between 1437-1439 at the Klosterneuburg Monastery. Leopold III founded the church in 1114, which was built on an older church foundation at the site of an earlier Roman fortress. A website outlining Stift Klosterneuburg's 900 year history mentions nothing about an 11th century *Death of Mary* painting. See

http://www.augustiniancanons.org/Klosterneuburg/a history of stift klosterneubur.htm

¹⁴ With the caveat that it can be difficult to tell rivet from bow spectacles in artwork because often the nose area is obscured, the earliest rigid bridge image I have found to date is represented in Van Eyck's *The Virgin and Child with Canon van der Paele* in 1434 (Figure 73).

¹⁵ The earliest surviving painting that I have been able to find of a woman actually reading and wearing spectacles is Jan Lievens' s *Old Woman Reading* (1621-23) followed

by Honthorst's Old *Woman Examining a Coin* (1623) and *Rembrandt's Mother (Portrait of the Artist's Mother)* in 1629. Art historians disagree over who actually painted the last work. Bridgeman Art Library lists the work by Rembrandt, whereas Sister Wendy Beckett (1999, p. 268) stated that work was downgraded to the lesser artist, Lievens. Other scholars think that the painting was a joint effort by both artists.

¹⁶ Rosenthal (1996) suggested that this practice was less than comfortable because "pressing the glasses on the lower part of the nose caused obstruction of the nasal passages, with accompanying voice change and respiratory problems" (p. 236).

¹⁷ Neil Handley (2006), Curator at the BOA Museum, suggested that the advertising trading card owned by the College of Optometrists indicated that Scarlett swirls were initially made in the 1720s (c. 1727-30). Also see <u>http://www.college-optometrists.org/en/knowledge-centre/museyeum/online_exhibitions/spectacles/side.cfm</u>

However, Fleishman (2011d) found evidence in 2007 at the Bodleian Library that the swirls were possibly available as early as 1714. The implication here is that the first hinged spectacles with sides had to be invented as early as 1714 and no later than 1727. See http://www.antiquespectacles.com/trade_cards/scarlett/scarlett.htm

¹⁸ Dr. David Fleishman owns what is thought to be the oldest DATED sliding adjustable sides (1805), an invention believed to have occurred around the turn of the 19th Century. The spectacles (Figure 97) were originally in the Hugh Orr Collection. ¹⁹ Shagreen is the rough untanned granular skin of a rayfish or shark. Popularized

¹⁹ Shagreen is the rough untanned granular skin of a rayfish or shark. Popularized in 18th century France, eyeglass cases (as well as other luxury items such as snuffboxes, wig-holders, and perfume containers) were covered with this type of scaly leather usually dyed green. See <u>http://en.wikipedia.org/wiki/Shagreen</u> and <u>http://www.antiquespectacles.com/glossary/glossary.htm</u>

²⁰ Originally in the Hugh Orr Collection, Dr. Fleishman now owns what is thought to be the world's oldest extant Franklin bifocal spectacles. Currently on loan to the Independence National Historical Park, this pair of split-lens will be displayed at the Franklin Museum in Philadelphia after touring the US as part of the Franklin Tercentenary Exhibition called *Benjamin Franklin: In Search of a Better World* (2007-2011).

²¹ See Sellers (1962) for a comprehensive listing of Franklin portraits in which the great man wears spectacles.

²² Charles Willson Peale did a second painting of Franklin with bifocals in 1789 just before the inventor's death. The painter wanted to do it in life, but Ben was so ill that Peale had to base this 2nd portrait on the 1785 original (Wood, 2004, p. 213).

²³ The smaller folding pair kept in a silver case had short sides and cup-shaped finials. Made by Burt and Willard these glasses are quite rare. They have a patent date stamped on the back of the nose bridge, according to Dr. David Fleishman of Antique Spectacles and Other Vision Aids Online Museum. The larger gold-rimmed spectacles with adjustable sides have an inscription on one of the sidearms that says "A. Lincoln, presented by Ward H. Lamon."

²⁴ Monet's oeuvre depicting literacy events were executed in his 30s and 40s between 1870 and 1887. The artist's style was more detailed with clearer lines and more vibrant colors than later paintings. All were outdoor scenes with women reading, but according to common practice, no spectacles were in sight!

²⁵ "A gig was a small light carriage pulled by one horse. It was lit at night by two oil lamps with thick glass, called gig-lamps. These gave a double halo effect in the dark as it approached. Today some types of glasses can be called gig-lamps when they have very thick glass like the original lamps...." Retrieved from WordReference.com: http://forum.wordreference.com/showthread.php?t=867897

²⁶ According to the Vintage Eyeglass Warehouse website, plastic browline glasses of this era are hard to find because the plastic tended to shrink over time; and because the metal frames are solid, most frames cracked. See

http://www.eyeglasseswarehouse.com/pages/plastic-menbrowline.html

²⁷ The phrase "radiant darkness" is from a small 2007 exhibition entitled *Radiant Darkness: The Art of Nocturnal Light* at the J. Paul Getty Museum in CA, featuring Gerrit Dou and other artists' special skill in chiaroscuro. See the Getty website overview at <u>http://www.getty.edu/art/exhibitions/radiant_darkness/</u>

²⁸ Artist Quint Buchholz was diagnosed when he was a child with a vision problem in which his eyes were poorly aligned (called "walleyed" or "stereo blind"). Livingstone & Conway (2004) believe Rembrandt was stereo blind just as Buchholz was. This condition causes the person to have no depth of vision and see everything flat. Thus, Buchholz as a painter, finds it easy to translate three dimensional impressions of reality into two dimensional images and turns an eye defect into an advantage (see http://www.quintbuchholz.de/en/articles/how-it-all-began.html

²⁹ See the article *Lighting* from the *Canadian Encyclopedia* website for a discussion of the three time periods in the evolution of lighting. Retrieved from <u>http://www.thecanadianencyclopedia.com/index.cfm?PgNm=TCE&Params=A1ARTA00</u>04681

³⁰ A cresset stone was a flat stone (often square) with single or multiple cupshaped hollows. Multiple cups looked like an egg box. Most common to church or monastery sites in Great Britain, cressets were fill with oil or tallow with a floating wick to produce a primitive form of artificial light.

³¹ Splinters were made of narrow splits of wood systematically cut and tied together. Made with resinous wood (especially pine) or sometimes treated with combustible material, they were in effect, skinny torches. Probably developed by the ancient Egyptians, *rushlights* were actually a miniature torch formed by dipping the peeled rush plant in fat or grease. We think of them as the first primitive candle.

³² On a personal note, while I was finishing this paper, a storm knocked out our electric power for 24 hours. In a stroke of irony, I spent two hours at night editing a printed copy of this manuscript by candlelight. With my tired aging eyes, it took the light of five candles for me to decently see the text and even that caused me some eyestrain and a headache!

³³ In addition to "coal oil," kerosene was also referred to as "paraffin" by the British or just "petroleum" by others on the Continent.

³⁴ Like James Joyce, Monet and others, Cassatt was an artist who was devastated by failing vision and eye disease. In fact, her ocular problems forced her to stop painting in 1915 and by 1918 she could no longer read. Historians think that she painted exclusively in pastels at the end of her career because they allowed her to accommodate her vision loss with more fuzzy lines and fewer details, particularly in facial representations (see Marmor & Kavin, 2009, pp. 160-163).

³⁵ *The Long Island Farmer*, Jamaica, NY, March 15, 1895, p. 4. Retrieved from http://antiqueclippings.blogspot.com/2008/06/rochester-lamp-company-1895.html

³⁶ Much of Quint Buchholz's oeuvre expresses a fascination with books, light and reading. Some 25 of his paintings have unique messages about what it means to be literate. Perhaps more than any artist, he represents an intriguing interplay between impaired eyesight, light and literacy (See Footnote 28).

³⁷ The most current 21st century eyewear technology solution to poor vision is called *Superfocus* spectacles invented by Stephen Kurtin and produced by Superfocus, LLC out of California. These dual-lens glasses (which look amazingly like James Joyce's Empire Ovals) manually adjust for individual prescriptions for hyperopia, presbyopia, myopia, and/or astigmatism to "give clear undistorted vision whether reading a book, working on the computer or looking into the distance" (Totty, 2010). Superfocus eyewear has been awarded several prestigious industry awards, including the *Wall Street Journal 2010 Innovations Silver Award* and is being used by the astronauts on Discovery's final spaceflight (Spring, 2011) and aboard the International Space Station. Retrieved from http://www.superfocus.com/superfocus-certified-by-nasa-for-astronauts

³⁸ Compared to other eras, artists of the 20th century have produced few paintings representing either literacy or vision aids. With some exceptions, it is very difficult to find contemporary art works with people reading and writing, let alone wearing spectacles at the same time. Possible reasons for this shift are (a) the decline of figurative art— the genre of representational painting was out of vogue for most of the era; and (b) the age of pervasive and cheap photography and digital technologies have virtually killed the once widespread middle or upper class portraiture painting (of real people) dating back to the Renaissance; and (c) like digital photography, spectacles are common place, cheap and ubiquitous.

³⁹ As Hamilton (2000) suggests, "visible literacy events are just the tip of an iceberg: literacy practices can only be *inferred* from observable evidence because they include invisible resources, such as knowledge and feelings; they embody social purposes and values; and they are part of a constantly changing context, both spatial and temporal" (p. 18).

(p. 18). ⁴⁰ Another caution has to do with the artists themselves. Painters crafted works with literacy at their center with biases, motives and expectations ruled by the era and society as a whole, and often patrons (who were paying them) in particular. Some literacy practices may well have been artificially constructed for show or public display. In addition, artists used conventions that were often exaggerated, unrealistic or just plain false (e.g., Jerome writing with eyeglasses or a reader with a book faced away from the firelight.) In a nutshell, all cannot be trusted in a painting!

Figures

Figure 1. Forms and Surfaces of Literacy Technologies. PowerPoint slide. Collage from stone tablets to computers complied by Sarah Dowhower. Keynote Presentation, American Reading Forum, December 10, 2010.

Figure 2. Writing Tools and Accessories. PowerPoint slide. Collage of composing instruments and supplemental devices complied by Sarah Dowhower. Keynote Presentation, American Reading Forum, December 10, 2010.

Figure 3. Literacy Furniture. PowerPoint slide. Collage of furniture specifically crafted for reading and writing complied by Sarah Dowhower. Keynote Presentation, American Reading Forum, December 10, 2010.

Figure 4. Storage and Protection. PowerPoint slide. Collage of materials that safeguard literacy artifacts complied by Sarah Dowhower. Keynote Presentation, American Reading Forum, December 10, 2010.

Figure 5. Vision Aids (and Accessories). PowerPoint slide. Collage of tools that improve eyesight for reading and writing complied by Sarah Dowhower. Keynote Presentation, American Reading Forum, December 10, 2010.

Figure 6. Illumination. PowerPoint slide. Collage of artificial lighting tools that improve sight complied by Sarah Dowhower. Keynote Presentation, American Reading Forum, December 10, 2010.

Figure 7. Cuneiform clay tablet. C. 2350 BCE. An account of barley rations issued monthly to adults (30 or 40 pints) and children (20 pints) written in year 4 of King Urukagina. From Ngirsu, Iraq. London, British Museum. BM 102081. Photo retrieved from http://en.wikipedia.org/wiki/File:Issue of barley rations.JPG

Figure 8. Tefillin (Phylactery): Qumran XQ Phyl 2. 1st century CE. 4.3 x 2.7 cm. Imaged reproduced by Gary D. Martin (2006) from *Tefillin from Qumran* by Yigael Yadin, (*XQ Phyl 1-4*), Plate XV. Retrieved from <u>http://aoal.org/bt/tefillin.html</u>

Figure 9. A Roman glass globe from Bonn Museum, Germany. Robert Temple holds the water-filled ball over letters to show how they can be enlarged. Photo used with permission of Robert Temple. From *The Crystal Sun* by Temple (2000), Plate 50 with description on pp. 404-405.

Figure 10. Oldest surviving mirror. 6000-5900 BCE. Photograph of a young woman viewing herself in a mirror manufactured at Catal Höyük, Turkey. Enoch (2009), Figure 3. Photo with permission of author and retrieved from

Figure 11. Roman waxed tablet replica. n.d. Photo retrieved from <u>http://historicconnections.webs.com/historyofwriting.htm</u>

Figure 12. Modern hand mirror. 2011. Photographer, Sarah Dowhower.

Figure 13. Modern magnifying mirror. 2011. Photographer, Sarah Dowhower.

Figure 14. Attributed to Python. *Aphrodite* detail. 350-340 BCE. Paestan Red Figure Greek Vase, Louvre N3157. Paris, Musée de Louvre. By the mirror's reflection above, Aphrodite is watching from heaven as her son-in-law Kadmos confronts the Drakon (Ismenian dragon) in the sky. If the mirror was concave, the scene would be enlarged. Image used with permission of Aaron Atsma, Curator of the Theoi Project. Retrieved from <u>http://www.theoi.com/Gallery/K10.16.html</u>

Figure 15. Tommaso (Tomaso) da Modena. *Chapter House with Forty Dominican Dignitaries.* 1352. Fresco, average height of 150 cm. Treviso, Italy, Chapter House of the Dominican Monastery of the Church of San Nicoló. Photo used with permission of Dominican History Blog, Brothers of the Province of St. Joseph. Paintings of famous Dominican clerics in history: two popes, 18 cardinals, 17 Dominican friars and 3 faintly seen saints (Dominic, Peter Martyr and Aquinas) hard at work at their desks in scholarly pursuits. View a video of the cycle on four walls and photo from the Dominican History website: <u>http://dominicanhistory.blogspot.com/2011/05/forty-dominicans-at-their-desks.html</u>

For individual pictures of all the Dominicans in their cells see the *Cycle of the Dominicans* from the Dominican History website: http://www.lionstrevisoduse.org/tomaso/eng/html/opere/capitolo/altri.htm

Figure 16. Tommaso (Tomaso) da Modena. *Portrait of Pietro Isnardo da Chiampo of Vicenza* with magnifying mirror. 1352. Fresco. Treviso, Italy, Chapter House of the Dominican Monastery of the Church of San Nicoló. Image used with permission of Dr. David A. Fleishman, Curator of Antique Spectacles and Other Vision Aids Online Museum. Retrieved from

http://www.antiquespectacles.com/slide shows/non vision aids/nva.htm

Figure 17. Master of the White Inscriptions. *Vincent de Beauvais, Author Portrait* detail and detail of an enlarging mirror. Late 15th century. Illuminated manuscript in *Speculum Historiale*, Royal 14 E I, fol. 3, London, British Library. A Dominican monk, sitting at a desk and writing, frontispiece of Book 1. Courtesy of © British Library Board. Retrieved from

http://www.bl.uk/catalogues/illuminatedmanuscripts/ILLUMIN.ASP?Size=mid&IllID=4 3440

Figure 18. Tommaso (Tomaso) da Modena. *Jerome in his Study* with detail of hornedshaped mirror. 1352. Column fresco, 210 x 515 cm. Treviso, Italy, Nave of the Church of San Nicoló. Photographer, Gali-Dana and used with permission. Retrieved from http://www.flickr.com/photos/crivelli/4184925154/ *Figure 19.* Niccolo Colantonio. *Jerome in his Study* and detail of horned-shaped mirror. 1445. Oil on wood, 125 x 151 cm. Naples, Museo di Capodimonte. Retrieved from http://en.wikipedia.org/wiki/File:Colantonio.jpg

Figure 20. Giovanni Battista Palatino. *Instruments of Writing* and detail of a hornedshaped writing mirror. 1540/1545/1566. Woodcut, 206 x 145 mm. *Libro nuovo d'imparare a scrivere (New Book for Learning to Write).* Rome: Camp di Fiore. Retrieved from the Internet Archive, Open Library website (p. 116/134): http://www.archive.org/stream/librodimgiovamba00pala#page/n0/mode/2up

Figure 21. Reading stone. n.d. Plano-convex lens. Oberkochen, Germany, Zeiss Optical Museum. Image used with permission of Dr. David A. Fleishman, Curator of Antique Spectacles and Other Vision Aids Online Museum. Retrieved from http://www.antiquespectacles.com/history/reading_stone.htm

Figure 22. Modern dome magno-illuminator. 2011. Acrylic with magnification power of 4X (12 diopters). Photographer, Sarah Dowhower.

Figure 23. Sloane Lens (60869-A). n.d. Quartz. Biconvex oval lens ranging from 6.5-8.5 diopters and magnification of 2 ½-3X. London, Natural History Museum, Sir Hans Sloane Collection. Photo by Robert Temple and used with permission. From *The Crystal Sun* by Temple (2000), Plate 53 with description on p. 405.

Figure 24. Ludwig Konraiter. St. Anna, Madonna with Babe and 10 Virgin Saints from Life of St. Mary and St. Ursula Altarpiece and detail of St. Ottilia with reading stones. 1485–1490. Oil on panel. Innsbruck, Austria, Museum of Wilten Monastery (Tyrol). Scanned from C. Frugoni (2003) Figure 17, p. 24. Detail retrieved from http://www.optiker.at/archiv/galerie/wilten/wilten.htm

Figure 25. Lucos Cranach the Elder. *Saints Christina and Ottilia* detail. 1506. St. Catherine Altarpiece: Reverse of Shutters. Oil on linden, 123 x 67 cm. London, National Gallery. Retrieved from

http://commons.wikimedia.org/wiki/File:Lucas_Cranach_the_Elder_-Saints_Christina_and_Ottilia_-_Google_Art_Project.jpg

Figure 26. Table Reliquary and detail of #4 window. 1220-1225. Wood and rock crystal, 405 x 450 mm; diameter 64 mm of #4. Treasure Room in the Cathedral of Halberstadt, Germany. Image courtesy of Domschatzverwaltung Halberstadt, owner, at http://www.dom-und-domschatz.de

Also see <u>http://www.transromanica.com/en/poi/?artikel=127</u> (Click on "History" for image.)

Figure 27. Mauritius Rotunda or Chapel of the Holy Sepulcher. C. 1250-1260. Sculpture of painted sandstone, diameter 2.43 m, height 4.65 m. Chapel in the Cathedral

of Constance (Konstanz), Germany. Photo retrieved from http://commons.wikimedia.org/wiki/File:Konstanz Muenster Heiliggrab.jpg?uselang=de

Figure 28. Greek Hippocrates as a pharmacist. C. 1250-1260. Sculpture of painted sandstone. Interior of the Gothic Holy Sepulcher, Mauritius Rotunda, Chapel in the Cathedral of Constance (Konstanz), Germany. Image used with permission of Dr. David A. Fleishman, Curator of Antique Spectacles and Other Vision Aids Online Museum. Retrieved from http://www.antiquespectacles.com/slide_shows/non_vision_aids/nva.htm

Figure 29. Tommaso (Tomaso) da Modena. *Portrait of Cardinal Nicolas of Rouen* and detail of single reading lens. 1352. Fresco. Treviso, Italy, Chapter House of the Dominican Monastery of the Church of San Nicoló. Image by permission of Dr. Emil Krén, Editor of Web Gallery of Art. Retrieved from <u>http://www.wga.hu/frames-e.html?/html/t/tommaso/index.html</u>

Figure 30. Andrea de' Bartoli. *Philosophers confronting St. Catherine* detail of singular lens use. 1367-69. Fresco. Assisi, Italy, Chapel of St. Catherine of Alexandria, Lower Church of St. Francis and burial chapel of Franciscan Cardinal Albornoz (d. 1367). Image used with permission from Dr. David A. Fleishman, Curator of Antique Spectacles and Other Vision Aids Online Museum. Retrieved from http://www.antiquespectacles.com/rivet_spectacles/paintings/paintings.htm

Figure 31. Raphael. *Pope Leo X with Two Cardinals* and detail of single concave lens. 1517-1518. Oil on wood, 154 x 119 cm. Florence, Galleria degli Uffizi. Image used by permission of Dr. Emil Krén, Editor of Web Gallery of Art. Retrieved from http://www.wga.hu/frames-e.html?/html/r/raphael/5roma/5/09leo_x.html

Figure 32. Jacope Chimenti (called Jacope da Empoli). *Michelangelo Presents His Model of San Lorenzo to Leo X, 1617-19.* Paint on wood, 2.36 x 1.41 m. Florence, Casa Buonarotti. Image used with permission of kleio.org website and retrieved from http://www.kleio.org/en/history/famtree/medici/663.html

Figure 33. Examples of long and short handled quizzing glasses. Left: c. 1820. Gold octagonal magnifying lens, 4 $\frac{1}{4}$ in. long. Right: c. 1830. Tiny rectangular sterling silver with swivel hand, $1\frac{3}{4}$ in. long. In Hern (2004), Figure 5. Image used with permission from Candice Hern. Retrieved from

http://www.candicehern.com/collections/04/eyeglass.htm

Figure 34. I. Robert and George Cruikshank. *Tom and Jerry Taking the Hint.* 1830. Oil on canvas. Private Collection. Appeared in Pierce Eagan's *Life in London*, 1830. Retrieved from <u>http://www.wikigallery.org/wiki/painting_229042/I.-Robert-and-George-Cruikshank/Tom-and-Jerry-taking-the-hint-at-Logics-being-blown-up-at-Point-Nonplus</u>

Figure 35. French School. *Theodore Rousseau.* 1850. Engraving. Private Collection. Retrieved from <u>http://www.wikipaintings.org/en/theodore-rousseau</u>

Figure 36. Richard Evans. *Olinthus Gilbert Gregory.* 1835. Lithograph engraved by H. Robinson. Private collection. Retrieved from http://en.wikipedia.org/wiki/File:Olinthus Gregory.jpg

Figure 37. Antoine Charles Horace Vernet (after). *A Lady in a Levantine Hat.* 1797. Aquatint engraving from *Incroyable et merveilleuse*, #6 plate of a series of fashion plates engraved by Georges Jacques Gatine (1773-1831). Image courtesy of Mark Harden, Artchive Web Gallery. Retrieved from <u>http://www.artchive.com/web_gallery/C/Carle-Vernet/A-Lady-in-a-Levantine-hat,-a-tiered-skirt-and-a-velvet-jacket,-plate-6-from-the-Incroyable-et-merveilleuse-series-of-fashion-plates,-engraved-by-Georges-Jacques-Gatine-1773-1831-published-1797-in-Paris.html</u>

Figure 38. Jean Auguste Dominique Ingres. *Madame Marie Marcotte (Marcotte de Sainte-Marie)* and detail of quizzer. 1826. Oil on canvas, 93 x 74 cm. Paris, Musée du Louvre. Retrieved from http://commons.wikimedia.org/wiki/File:Ingres_Madame_Marie_Marcotte.jpg

Figure 39. Pietro Longhi. *The Geography Lesson*. Before 1785. Oil on canvas. Venice, Italy, Galleria Querini-Stampalia. Retrieved from http://www.wikipaintings.org/en/pietro-longhi/the-geography-lesson

Figure 40. French cap monocle suspended from a forehead band with Ayscough doublehinged side temples. Late 18th C. Tortoiseshell. Image used with permission of Dr. David A. Fleishman, Curator of Antique Spectacles and Other Vision Aids Online Museum. Retrieved from

http://www.antiquespectacles.com/slide_shows/tortoiseshell/others/others.htm

Figure 41. Anna Dorothea Therbusch. *Self Portrait* detail of a spina-frontalis-monocle. C. 1780. Oil on canvas. Linz, Austria, Schlossmusuem. Image used with permission of Dr. David A. Fleishman, Curator of Antique Spectacles and Other Vision Aids Online Museum. Retrieved from http://www.antiquespectacles.com/people/people.htm

Figure 42. Anna Dorothea Therbusch. *Self Portrait with Monocle.* 1777. Oil on canvas, 153.5 x 118 cm. Berlin, Gemaldegalerie Staaliche. Retrieved from http://commons.wikimedia.org/wiki/File:Anna_Dorothea_Therbusch_001.jpg

Figure 43. Claude Monet. *Young Man with a Monocle* detail. 1857. Pastel and watercolor on paper, 240 x 160 mm. Paris, Musée Marmottan. Retrieved from http://www.artfinder.com/work/young-man-with-a-monocle-claude-monet/

Figure 44. Walter Greaves. *Portrait of James Abbott McNeill Whistler (1834-1903).* 1871. Oil on canvas, 63.5 x 76.2 cm. Private Collection. Image courtesy of the Art Renewal Center, Fred Ross, Chairman. Retrieved from http://www.artrenewal.org/pages/artwork.php?artworkid=10414

Figure 45. John Singer Sargent. *The Right Honourable Joseph Chamberlain.* 1896. Oil on canvas, 1619 x 914 mm. London, National Portrait Gallery. Retrieved from http://en.wikipedia.org/wiki/File:Joseph Chamberlain John Singer Sargent 1896.jpeg

Figure 46. James Spedding (attributed to). *Alfred Tennyson, 1st Baron Tennyson (1809-1892). C.* 1831. Pencil drawing, 197 x 140 mm. London, National Portrait Gallery, NPG 3940. Image used with permission. Retrieved from http://www.npg.org.uk/collections/search/portrait/mw06247/Alfred-Tennyson-1st-Baron-Tennyson?LinkID=mp04454&role=sit&rNo=0

Figure 47. Elliott & Fry. *Alfred Tennyson, 1st Baron Tennyson.* Late 1896s. Carbon print on card mount, 189 x 121 mm. London, National Portrait Gallery, NPGx126801. Image used with permission. Retrieved from

http://www.npg.org.uk/collections/search/portrait/mw82252/Alfred-Tennyson-1st-Baron-Tennyson?LinkID=mp04454&search=sas&sText=alfred+tennyson&wPage=1&role=sit& rNo=39

Figure 48. John Mayall. *A Portrait of Karl Marx.* 1875. Tinted photograph. Amsterdam, Netherlands, International Institute of Social History. One of four photos taken in rapid sequence by Mayall. 1200 prints were sent to socialists worldwide. Used with permission. Retrieved from <u>http://www.iisg.nl/collections/marx/a9-369.php</u>

Figure 49. George Grosz. The *Pillars of Society with Nazi and Monocle* detail. 1926. Oil on canvas, 200 x 108 cm. Berlin, Germany, Staatliche Museen-Preussischer Kulturbesitz, Nationalgalerie. Retrieved from http://www.abcgallery.com/G/grosz/grosz26.html

Figure 50. Herbert Morton Stoops. *They'll Give You a Fresh Start in Life.* 1941. Oil on canvas. The Philadelphia History Museum, Historical Society of Pennsylvania Collection. Part of a series of award winning wartime advertisements given to the HSP by The American Locomotive Company (Alco). See Atwater Kent Museum Cover of *Life*, January 4, 1943. Retrieved from

http://books.google.com/books?id=n04EAAAAMBAJ&pg=PA32&lpg=PA32&dq=%22t hey%27ll+give+you+a+fresh+start%22&source=bl&ots=sBhu03LgeP&sig=hJ5qVvr6m 0qvHim1210qCx_fXSg&hl=en&ei=MSPdTebGK6by0gHj4Oz5Dw&sa=X&oi=book_re sult&ct=result&resnum=2&ved=0CB0Q6AEwAQ#v=onepage&q=%22they%27ll%20gi ve%20you%20a%20fresh%20start%22&f=false

Figure 51. Edgar Degas. *At the Café Châteaudun.* 1869-1871. Pencil and oil on paper, mounted on canvas, 23.7 x 19 cm. London, National Gallery, NG6536. Image used with permission. Retrieved from <u>http://www.nationalgallery.org.uk/paintings/hilaire-germain-edgar-degas-at-the-cafe-chateaudun</u>

Figure 52. Francois Xavier Fabre. *Portrait of Abbot Thomas Valperga of Caluso* and detail of a portable magnifier. 1802. Oil on canvas. Torino, Italy, Muse Civico d'Arte Image used with permission of Dr. David A. Fleishman, Curator of Antique Spectacles and Other Vision Aids Online Museum. Retrieved from http://www.antiquespectacles.com/slide_shows/previous/previous_2.htm

Figure 53. Charles Spencelayh. *Fingerprints.* 1953. Oil on canvas, 43 x 53 cm. Bournemouth, UK, Russell-Cotes Art Gallery and Museum. See at Russell-Cotes Art Gallery and Museum Shop website: http://www.russellcotesartshop.co.uk/artist/7283/Charles Spencelayh

Figure 54. R. Klausner. *Close Scrutiny.* 19th century. Oil on panel, 37.5 x 26.5 cm. Private Collection. Retrieved from <u>http://www.wikigallery.org/wiki/painting_203651/R.-Klausner/Close-Scrutiny</u>

Figure 55. Norbet Goeneutte. *Dr. Paul Gachet.* 1891. Oil on panel, 35 x 26.7 cm. Paris, Musee d'Orsay. Retrieved from <u>http://commons.wikimedia.org/wiki/File:Norbert_G%C5%93neutte_-</u> <u>Le Docteur Paul Gachet.jpg</u>

Figure 56. Norman Rockwell. *Book of Romance.* 1927. Oil on canvas, 32 x 48 in. Stockbridge, MA, Norman Rockwell Museum. See at the Norman Rockwell Museum website:

http://collection.nrm.org/search.do?id=229832&db=object&view=full

Figure 57. Nuns' choir at Wienhausen Abbey, Germany. 1301. Photo retrieved from <u>http://www.viatoura.de/kloster-wienhausen/fotogalerie/1.html</u> For more pictures and information also see Kloster Wienhausen website: <u>http://www.kloster-wienhausen.de/</u>

Figure 58. Three types of rivet spectacles, type 1, type 2 and type 3. 1330. Earliest surviving rivet spectacles found at Wienhausen Abbey, Germany in 1953. Photos used with permission of Dr. David A. Fleishman, Curator of Antique Spectacles and Other Vision Aids Online Museum. Retrieved from http://www.antiquespectacles.com/topics/wienhausen/3/spectacles.htm

Figure 59. Salisbury nun wearing rivet type 1 spectacles and detail. 1330/1430-1440. Corbel on the north aisle of the Parish Church of Sarum St. Martin, Salisbury, UK. London, The College of Optometrists/British Optical Association Museum. Images used with permission of Neil Handley, Curator BOA Online Museum. Retrieved from <u>http://www.college-optometrists.org/en/knowledge-</u> centre/museyeum/online_exhibitions/spectacles/rivet.cfm

Figure 60. Westphalian Master. *The Relatives of St. Anne (Holy Kinship)* detail of Zebedee reading with rivet type 1 spectacles. C. 1470. Panel painting, 69 x 144 cm.

Maastricht, Netherlands, Basilica of St. Servatus, Cathedral Treasury. Also called *The Blood-Relationship (Consanguinity) of St. Anna.* Zebedee is St. Anne's third daughter, Mary Salome's husband. Their children were St. James the Greater and St. John the Evangelist. Image used with permission from Hans Meijer, Foundation Musick's Monument. Retrieved from

http://web.mac.com/musicksmonumentdownl/Holy_Kinship_Maastricht/Holy_Kinship_. html

Figure 61. Konrad von Soest. *Glasses Apostle (St. Luke?).* 1403. Wildungen Altar. Tempera on wood, 188 x 152 cm. Germany, Church of Bad Wildungen. One of the oldest depictions of eyeglasses north of the Alps. Retrieved from http://commons.wikimedia.org/wiki/File:Conrad_von_Soest, %27Brillenapostel%27_(14 03).jpg

Figure 62. Tommaso (Tomaso) da Modena. *Cardinal Hugh de Saint Cher* and detail of rivet reading glasses. 1352. Fresco. Treviso, Italy, Chapter House of the Dominican Monastery of the Church of San Nicoló. Earliest known representation of spectacles in a painted work of art. Retrieved from

http://commons.wikimedia.org/wiki/File:Tommaso_da_modena,_ritratti_di_somenicani_ (Ugo_di_Provenza)_1352_150cm, treviso, ex_convento_di_san_niccolò, sala_del_capit_ olo.jpg_t_spectacles/paintings/paintings.htm

Figure 63. Dr. Vincent Ilardi (1925-2009), Emeritus Professor of History, University of Massachusetts wearing replica of rivet type 1 spectacles. Photo used with permission of Dr. David A. Fleishman, Curator of Antique Spectacles and Other Vision Aids Online Museum. Retrieved from

http://www.antiquespectacles.com/topics/ilardi/images/ilardi_images.htm

Figure 64. Monk in a choir with tong spectacles, a prototype of scissor spectacles. 14th century. Choir book illuminated manuscript. Florence, Convento di San Marco. Image used with permission of Dr. David A. Fleishman, Curator of Antique Spectacles and Other Vision Aids Online Museum. Retrieved from

http://www.antiquespectacles.com/rivet_spectacles/representations/representations.htm

Figure 65. Antiphonarium and detail of singer with spectacles. 15th century. Illuminated manuscript. Florence, Biblioteca Medicea Laurenziana, MS. Edili 146, fol. 62. Images used with permission of Dr. David A. Fleishman, Curator of Antique Spectacles and Other Vision Aids Online Museum. Retrieved from http://www.antiquespectacles.com/topics/ilardi/images/ilardi_images.htm

Figure 66. Andrea de' Bartoli. *Philosophers confronting St. Catherine* detail of single lens and spectacle use. 1367-69. Fresco. Assisi, Italy, Chapel of St. Catherine of Alexandria, Lower Church of St. Francis and burial chapel of Franciscan Cardinal Albornoz (d. 1367). Image used with permission of Dr. David A. Fleishman, Curator of Antique Spectacles and Other Vision Aids Online Museum. Retrieved from http://www.antiquespectacles.com/rivet_spectacles/paintings/paintings.htm *Figure 67.* Circle of Derick Baegert. *Death of Saint Martin of Tours and St. George as Dragon Slayer* detail. C. 1480. Oakwood altarpiece, Nr.383WKV. Munster, Germany, Westfälisches Landesmuseum. Image used with permission of Dr. David A. Fleishman, Curator of Antique Spectacles and Other Vision Aids Online Museum. Retrieved from http://www.antiquespectacles.com/rivet_spectacles/altarpieces.htm

Figure 68. Death of Mary and detail. *C.* 1370-1386. Left inside wing of the Schloss Altarpiece of Tyrol (Tirol) Castle. Tempera on beechwood altarpiece. Innsbruck, Austria, Museum Ferdinandeum. Image with permission of photographer Andra Moclinda and retrieved at <u>http://www.flickr.com/photos/andra_mb/4104582111/</u>

Figure 69. Workshop of Hans and Jakob Strueb. *Death of Mary* detail of Bartholomew and an older Apostle with rivet 1 type spectacles. 1510. Pine panel altarpiece, 73 x 93 cm. Kunzelsau, Germany, Museum Würth Collection. Image used with permission of Dr. David A. Fleishman, Curator of Antique Spectacles and Other Vision Aids Online Museum. <u>http://www.antiquespectacles.com/topics/religion/paintings/paintings.htm</u>

Figure 70. Death of Mary and detail. C. 1418. Altarpiece. Paint on wood panel. Hannover, Germany, Neidersächsisches Landesmuseum. Possibly the earliest representation of tinted spectacles, probably type 1. Images used with permission of Dr. David A. Fleishman, Curator of Antique Spectacles and Other Vision Aids Online Museum. Retrieved from

http://www.antiquespectacles.com/rivet_spectacles/paintings/paintings.htm#

Figure 71. Master of the Altar Albrecht. *Dormition of the Virgin* and detail of apostle with rivet 2 spectacles in shared reading. 11th century/1437-1439. Albrecht Altarpiece. Painted wood. Vienna, Klosterneuberg Monastery. Retrieved from http://upload.wikimedia.org/wikipedia/commons/1/18/Meister_des_Albrechtsaltars_005.jpg

Figure 72. Earliest surviving leather framed spectacles found in Willibald Pirchkheimer's study and detail of a slit bridge. C. 1520-30. Eisenach, Germany, Wartburg Castle. Photographs courtesy of Dr. David Fleishman, Curator of Antique Spectacles and Other Vision Aids Online Museum.

Figure 73. Jan Van Eyck. *The Virgin with the Canon van der Paele* (1370-1443) and detail of leather spectacles. 1436. Oil on wood panel, 141 x 176.5 cm. Bruges, Groeninge Museum. Image by permission of Dr. Emil Krén, Editor of Web Gallery of Art. Retrieved from <u>http://www.wga.hu/index1.html</u> (Search under Eyck and Paele)

Figure 74. Ezra renewing the law. 1465-1470. Illuminated manuscript on vellum. Philadelphia Museum of Art, *Pembroke Hours (Book of Hours for the Sarum Use and Gallican Psalter with Canticles)*, MS 2, fol. 109v. Retrieved from http://www.leavesofgold.org/gallery/psalters/psalter09.html *Figure 75.* Ludovico Mazzolino. *The Adulteress before Christ* and detail of leather bow spectacles and eyeglass case. Early 16th century. Oil on panel. Zagreb, Croatia, Croatian Academy of Science and Art, Strossmayer's Old Masters Gallery. Photographer, Sheepdog Rex and used with permission. Retrieved from

http://www.grphas.com/photos/sheepdog_rex/5855650657/in/set-72157627011664262/ Detail retrieved from

http://www.flickr.com/photos/sheepdog_rex/5856204848/in/photostream/lightbox/

Figure 76. Jose Van Cleve (after). *Saint Jerome in His Study* and detail of bow spectacles. 16-17th centuries. Oil on canvas, 85 x 63 cm. London, The College of Optometrists/British Optical Association Museum. Images used with permission of Neil Handley, Curator BOA Online Museum. Retrieved from College of Optometrists website at <u>http://www.college-optometrists.org/en/knowledge-centre/museyeum/online_exhibitions/artgallery/memento.cfm</u>

Figure 77. Georges de la Tour. *Saint Jerome Reading*. 1621-23. Oil on canvas on wood, 63.3 x 55 cm. London, Royal Collection, Hampton Court. Retrieved from http://commons.wikimedia.org/wiki/File:LA_TOUR,_Georges_de_- Saint Jerome Reading (1621-23).jpg

Figure 78. Georges de La Tour. *Saint Jerome Reading.* 1652. Oil on canvas, 122 x 93 cm. Paris, Musée du Louvre. Photographer, Ondra Havala and used with permission. Retrieved from <u>http://www.flickr.com/photos/havala/4081065416/</u>

Figure 79. William van Drielenburg. *Jerome Reading* and detail of Nuremberg wire spectacles. 1677. Oil on canvas, 115 x 118 cm. Palermo, Italy, Private Collection. Retrieved from <u>http://www.anticoantico.com/categoria_dettaglio.asp?articolo=48707</u>

Figure 80. Jan Lievens. *Old Woman Reading.* 1621-23. Oil on panel, 71.4 x 67.3 cm. Philadelphia Museum of Art. Retrieved from http://www.philamuseum.org/collections/permanent/102271.html?mulR=30755|14

Figure 81. Rembrandt (and/or Jan Lievens). *Portrait of Rembrandt's Mother.* 1629. Oil on canvas, 76 x 64 cm. Salisbury, UK, Collection of the Earl of Pembroke, Wilton House. Image courtesy of photographer, Sibi. Retrieved from <u>http://www.flickr.com/photos/beebee/3781490802/</u> Also see at <u>http://www.antiquevaluers.co.uk/old_harlequins/articles/wilton2.html</u>

Figure 82. Antonio Pisanello. Three men, one with cap rivet spectacles (from the records of the Council of Constance). First half of the 15^{th} century. Drawing of brown ink wash, 0.190 x 0.203 m. Paris, Musée du Louvre. Image used with permission of \mathbb{C} Musée du Louvre. Retrieved from <u>http://arts-</u>

graphiques.louvre.fr/fo/visite?srv=mipe¶mAction=actionGetImage&idImgPrinc=1& idFicheOeuvre=3465&provenance=mlo&searchInit= *Figure 83.* B. Caraviello. *Bishop Alfonso of Liquori.* 1768. Paint on burlap. Pagani, Italy, Museum Alfonsiano di Pagani. Image used with permission of Dr. David A. Fleishman, Curator of Antique Spectacles and Other Vision Aids Online Museum. Retrieved from http://www.antiquespectacles.com/slide_shows/previous/2.htm

Figure 84. El Greco. *The Portrait of a Cardinal* detail. C. 1600. Oil on canvas, 170.8 x 108 cm. New York, Metropolitan Museum of Art. Image by permission of Dr. Emil Krén, Editor of Web Gallery of Art. Retrieved from <u>http://www.wga.hu/frames-e.html?/html/g/greco_el/1596-600/13cardin.html</u>

Figure 85. Émile Zola (1840-1902). 1902. Photo. Retrieved from http://en.wikipedia.org/wiki/File:ZOLA_1902B.jpg

Figure 86. Edouard Manet. *Portrait of Émile Zola* and detail of pince-nez. 1868. Oil on canvas, 146 x 114 cm. Paris, Musee d'Orsay. Retrieved from <u>http://en.wikipedia.org/wiki/File:Manet,_Edouard_-_Portrait_of_Emile_Zola.jpg</u>

Figure 87. Marcellin Gilbert Desboutin. *Edgar Degas.* Before 1900. Oil on burlap, 46 x 31 cm. Versailles, France, Musée National du Château et des Trianons. Retrieved from http://commons.wikimedia.org/wiki/File:Marcellin_Desboutin_- Portrait_Edgar_Degas.jpg

Figure 88. Karl Johann Becker-Gundahl. *Theodore Roosevelt.* 1925. Oil on panel, 34.3 x 22.9 cm. San Marino, CA, The Huntington Library, Art Collections, and Botanical Gardens. Courtesy of the Huntington Art Collections, San Marino, California. Retrieved from <u>http://emuseum.huntington.org/view/objects/asitem/212/211/title-asc?t:state:flow=2fd7e419-5223-49af-bf64-b19e656fb95e</u>

Figure 89. Scarlett temples with swirls. C. 1728-1730. Brass frames. Germany, Kassel Museum. Photo used with permission of Dr. David A. Fleishman, Curator of Antique Spectacles and Other Vision Aids Online Museum. Retrieved from http://www.antiquespectacles.com/slide shows/temple spectacles/temple spectacles.htm

Figure 90. Scarlett temples with rings. C. 1780. Iron framed. Washington, DC, Museum of Science and Industry. Photo used with permission of Dr. David A. Fleishman, Curator of Antique Spectacles and Other Vision Aids Online Museum. Retrieved from http://www.antiquespectacles.com/slide shows/temple spectacles/temple spectacles.htm

Figure 91. Straight-arm temples. C. 1800. Brass round framed with C-bridge and small finials. From the original Hugh Orr Collection. Photo used with permission of Dr. David A. Fleishman, Curator of Antique Spectacles and Other Vision Aids Online Museum. Retrieved from <u>http://www.antiquespectacles.com/trade_cards/associated/associated.htm</u>

Figure 92. Anton Graff. *Portrait of Daniel Nikolaus Chodowiecki.* 1800-1801. Oil on canvas. Berlin, Staatliche Museum. Retrieved from http://commons.wikimedia.org/wiki/File:Graff Portrait Daniel Chodowiecki.jpg

Figure 93. Jean-Baptiste Chardin. *Self-Portrait with glasses.* 1771. Pastel, 46 x 38 cm. Paris, Musée du Louvre. Image by permission of Dr. Emil Krén, Editor of Web Gallery of Art. Retrieved from <u>http://www.wga.hu/frames-e.html?/html/c/chardin/index.html</u>

Figure 94. Jean-Baptiste Chardin. *Self-Portrait with eyeshade*. 1775. Pastel on blue paper, 46 x 38 cm. Oil on canvas, Paris, Musée du Louvre. Image by permission of Dr. Emil Krén, Editor of Web Gallery of Art. Retrieved from <u>http://www.wga.hu/frames-e.html?/html/c/chardin/index.html</u>

Figure 95. Double-hinged spectacles. C. 1760-80. Steel framed. Photograph courtesy of Dr. David Fleishman, Antique Spectacle and Other Visions Aids Online Museum.

Figure 96. Turn-pin temples. C. 1800. English silver framed. Hallmarked Pons (the maker.) Photograph courtesy of Dr. David Fleishman, Antique Spectacle and Other Visions Aids Online Museum.

Figure 97. Sliding pin-in-slot adjustable temples with small circle finials. 1805. Silver framed. Hallmarked English. Photograph courtesy of Dr. David Fleishman, Antique Spectacle and Other Visions Aids Online Museum. These temple spectacles are owned by Dr. Fleishman and are considered to be the oldest sliding sides with a date mark. They were originally in the Hugh Orr Collection.

Figure 98. Joshua Reynolds (as copied by a student). *Self Portrait* and detail of wig turn-pin spectacles. 1788. Oil on canvas, 75.2 x 63.2 cm. London, Royal Collection. Retrieved from <u>http://www.wikigallery.org/wiki/painting_361822/%28after%29-Sir-Joshua-Reynolds/Self-Portrait</u>

Figure 99. Turn-pin spectacles owned by Sir Joshua Reynolds. Before 1792. Silver with round lens frame, double-hinged with medium tear-shaped finials. Private Collection. Photo used with permission of Dr. David A. Fleishman, Curator of Antique Spectacles and Other Vision Aids Online Museum. Retrieved from http://www.antiquespectacles.com/people/people_earlier2.htm

Figure 100. Patrick Henry's surviving double-hinged temples. Before 1799. Richmond, VA, Virginia Historical Society. Photo used with permission of Dr. David A. Fleishman, Curator of Antique Spectacles and Other Vision Aids Online Museum. Retrieved from http://www.antiquespectacles.com/people/people_earlier2.htm

Figure 101. Thomas Sully. *Patrick Henry.* 1851. Oil on canvas, 30 x 25 in. Richmond, VA, Virginia Historical Society. The artist first painted this image in 1815 from a

miniature painting taken from life in 1795 by the artist's older brother Lawrence. Image used with permission. Retrieved from http://www.vahistorical.org/sva2003/henry.htm

Figure 102. Martin's Margins. C. 1780s. Steel, clear round lens, C-bridge, doublehinged temples with large teardrop ends. Photo used with permission and retrieved from the American Optometric Association website: <u>http://www.aoa.org/x10953.xml</u>

Figure 103. Benjamin Martin (1758). An Essay on Visual Glasses (Vulgarly called SPECTACLES) Wherein it is shewn, From the Principles of OPTICS, and the Nature of the EYE, that the Common Structure of those Glasses is contrary to the Rules of Art, to the Nature of Things, & c. and very prejudicial to the EYES, 4th edition. London, The College of Optometrists/British Optical Association Museum. Image used with permission of Neil Handley, Curator BOA Online Museum. Retrieved from http://www.college-optometrists.org/en/knowledge-centre/museyeum/online exhibitions/artgallery/antiques.cfm

Figure 104. Admiral Peter Rainier. 1778-1787. Oil on canvas, 76.5 x 63.8 cm. Boston, Museum of Fine Arts. Retrieved from <u>http://www.mfa.org/collections/object/admiral-peter-rainier-31255</u>

Figure 105. Addison Smith four lens spectacles first patented in 1783. Unknown owner. Photo used with permission of Dr. David A. Fleishman, Curator of Antique Spectacles and Other Vision Aids Online Museum. Retrieved at http://www.antiquespectacles.com/slide shows/4 lens/4 lens.htm

Figure 106. John Richardson-type four lens spectacles first patented in 1797 adjustable sides and teardrop finials. n.d. Storrs, New York State Museum. Photo used with permission of Dr. David A. Fleishman, Curator of Antique Spectacles and Other Vision Aids Online Museum. Retrieved at http://www.antiquespectacles.com/slide_shows/4_lens/4_lens.htm

Figure 107. Philip Hewins. *Portrait of Andrew Jackson* detail of four lens spectacles. 1833. Oil on canvas, 69.5 x 56.5 cm. Hartford, Connecticut Historical Society Museum and Library. Retrieved from

Figure 108. Benjamin Franklin. Franklin's design for bifocals. May 23, 1785. Washington, DC, Library of Congress. Image of original drawing in his letter retrieved from <u>http://explorepahistory.com/displayimage.php?imgId=5697</u>

Figure 109. Temple spectacles style worn by Benjamin Franklin before bifocals. Second half of 18th century. Steel C-bridge with round frames, temple sides with large circular finials. Photo used with permission of Dr. David A. Fleishman, Curator of Antique

Spectacles and Other Vision Aids Online Museum. Retrieved from http://www.antiquespectacles.com/topics/franklin/spectacles/spectacles.htm

Figure 110. David Martin. *Benjamin Franklin.* 1767. Oil on canvas, 127.2 x 101.4 cm. Washington, DC, White House Collection. Retrieved at http://en.wikipedia.org/wiki/File:Benjamin Franklin 1767.jpg

Figure 111. John Trumbull. *Benjamin Franklin.* 1778. Oil on wood, oval 5 ½ x 4 3/8 in. New Haven, CT, Yale University Art Gallery. Retrieved from http://commons.wikimedia.org/wiki/File:Benjamin_Franklin_by_John_Trumbull_1778.jp eg

Figure 112. Charles Willson Peal. *Benjamin Franklin* (in split-lens bifocals). 1785. Oil on canvas, 23 x 18 ¼ in. Philadelphia, Pennsylvania Academy of the Fine Arts. Retrieved from <u>http://commons.wikimedia.org/wiki/File:Peale_-_Benjamin_Franklin.jpg</u>

Figure 113. Detail from Jefferson's letter to John McAllister showing a sketch of design for spectacles. December 1, 1806. Retrieved from The Jefferson's Monticello website, Eyeglasses, *Thomas Jefferson Encyclopedia*, Charlottesville, VA: http://wiki.monticello.org/mediawiki/index.php/Image:Spectacles-sketch.jpg

Figure 114. Detail of Abraham Lincoln's two pair of spectacles with cases. 1865. Contents of Abraham Lincoln's pockets on the night of his assassination on exhibit at the Abraham Lincoln Bicentennial Exhibit, 2009. Washington, DC, Library of Congress, Thomas Jefferson Building. Retrieved from: http://www.loc.gov/pictures/item/2011646850/

Figure 115. Franklin C. Courter. *Abraham Lincoln with His Son, Tad.* C. 1929. Oil on hardboard, 116.8 x 90.2 cm. Washington, DC, National Gallery of Art. Image used with permission. Retrieved from <u>http://www.nga.gov/fcgi-bin/tinfo_f?object=42915</u>

Figure 116. Philipp Galle after Johannes Stradanus. *Conspicilla* (Latin for eyeglass) in *Nova Reperta* (New Discoveries). C. 1580/1600. Engraving. London, The College of Optometrists/British Optical Association Museum. Image used with permission of Neil Handley, Curator BOA Online Museum. Retrieved from

http://www.museyeum.org/detail.php?type=related&kv=466&t=objects&PHPSESSID=7 5dacdb94d3ed48a1b0abd82b9a84f9e

or see http://www.vlaamsekunstcollectie.be/nl/uitvinding_van_de_bril.aspx

Figure 117. Frederick D. Hardy. *Try This Pair.* 1864. Oil on canvas, 28 x 41 cm. London, Guildhall Art Gallery. Retrieved from: http://www.wikigallery.org/wiki/painting 210958/Frederick-Daniel-Hardy/Try-this-pair

Figure 118. Edward Scarlett. Focus Mark of 70. C. 1728. Photo used with permission of Dr. David A. Fleishman, Curator of Antique Spectacles and Other Vision Aids Online

Museum. Retrieved from http://www.antiquespectacles.com/trade cards/associated/associated.htm

Figure 119. Paul Gauguin/Ky Dong. *Self-Portrait.* 1902-1903. Oil on canvas, 42 x 25 cm. Basel, Switzerland, Kunstmuseum. Retrieved from http://en.wikipedia.org/wiki/File:Gauguin Autoritratto 1902.jpg

Figure 120. Claude Monet's tinted ear-fitting cataract spectacles. C. 1923 or later. Paris, Musée Marmottan Monet. Photo used with permission of Dr. David A. Fleishman, Curator of Antique Spectacles and Other Vision Aids Online Museum. Retrieved from http://www.antiquespectacles.com/people/people_present2.htm

Figure 121. Sir Edward Burne-Jones. *Rudyard Kipling.* 1899. Oil on canvas, 153 x 60 cm. New York, Granger Collection. Retrieved from http://en.wikipedia.org/wiki/File:Rudyard_Kipling_by_Sir_Philip_Burne-Jones_1899.jpeg

Figure 122. Jacques-Emile Blanche. *James Joyce.* 1935. Oil on canvas, 1251 x 876 mm. London, National Portrait Gallery NPG 3883. Image used with permission. Retrieved from <u>http://www.npg.org.uk/collections/search/portrait/mw03533/James-Joyce?LinkID=mp02467&role=sit&rNo=2</u>

Figure 123. James Joyce. Two pages from a *Finnegan's Wake Notebook* at Buffalo, Joyce 3.3. n.d. See at the website of Brepols, publishers of the *Finnegan's Wake Notebooks* at Buffalo, Daniel Ferrer, Geert Lernout & Vincent Deane (Eds.): http://www.brepols.net/publishers/pdf/Joyce.pdf

Figure 124. Hemingway in Kenya. 1953. Photo. Earl Theisen, photographer, *LOOK Magazine* Collection, Library of Congress, Prints & Photographs Division, [Reproduction number e.g., LC-L9-60-8812, frame 8]. Retrieved from http://www.bu.edu/english/graduate/ma-in-english-and-american-literature/

Figure 125. Randy Hofman. *Hemingway.* 1996. Oil on canvas. Ocean City, MD, Artist's Collection. Image used with Randy Hofman's permission. Retrieved from artist's website: <u>http://img408.imageshack.us/i.mg408/1996/hemingway4ke3.jpg</u>

Figure 126. Sir Joshua Reynolds. 1775. *Portrait of Samuel Johnson ("Blinking Sam")*. Oil on canvas, 76 x 63 cm. San Marino, CA. The Huntington Library, Art Collections, and Botanical Gardens. Retrieved from http://commons.wikimedia.org/wiki/File:Samuel Johnson by Joshua Reynolds 2.png

Figure 127. J. Anthony Willis. *Official Portrait of President Dwight D. Eisenhower.* 1962. Oil on canvas. Washington, DC, The White House Collection. Retrieved at http://en.wikipedia.org/wiki/File:Dwight_D_Eisenhower_official_Presidential_portrait.j pg

Figure 128. Gold clear plastic browline glasses owned by Eisenhower. C. 1960. Photo retrieved from

http://historical.ha.com/common/view_item.php?Sale_No=625&Lot_No=25500

Figure 129. French School, 20th Century. *AMOR Lunettes.* 1957. Color lithograph. Paris, Bibliotheque des Arts Décoratifs. Advertisement for 'Amor' glasses from *Elle*. Retrieved from <u>http://tootsie.skynetblogs.be/archive/2009/11/13/ancienne-reclame-dans-les-magazines.html</u>

Figure 130. Alexis Smith. *Men Seldom Make Passes at Girls Who Wear Glasses.* 1985. Wall painting with two framed mixed media collages, 68.6 x 462.83.8 x 9.5 cm each of 2. San Diego, Museum of Contemporary Art. Photographer Philipp Scholz Rittermann. © Alexis Smith 1985. Image used with permission. Retrieved from http://www.mcasd.org/artworks/men-seldom-make-passes-girls-who-wear-glasses

Figure 131. Andy Warhol. *Julia Warhola.* 1974. Acrylic and silkscreen ink on linen, 101.6 x 101.6 cm. Pittsburgh, PA, The Andy Warhol Museum. Retrieved from http://ifitshipitshere.blogspot.com/2011/05/from-durer-to-dali-famous-artists-paint.html

Figure 132. Alex Katz. *Poet Kenneth Koch.* 1970. Color lithograph of 5 colors on paper, 27 ¹/₂ x 21 ³/₄ in. Waterville, ME, Colby Museum of Art. Retrieved from http://www.colby.edu/academics_cs/museum/search/Obj4360?sid=9445&x=42243

Figure 133. Chuck Close. *Frank.* 1969. Acrylic on canvas, 274.3 x 213.4 x 7.6 cm. Minneapolis Institute of Art. Minneapolis Institute of Arts. © Chuck Close, courtesy of PaceWildenstein, New York. Retrieved from http://www.artsmia.org/viewer/detail.php?v=12&id=1721

Figure 134. Andy Warhol. *Lee Iacocca.* 1985. Acrylic and silkscreen ink on linen, 71.1 x 61 cm. Pittsburgh, PA, The Andy Warhol Foundation for the Visual Arts. See two versions at the Corbis Images website: http://www.corbisimages.com/Search#p=1&q=Lee+Iacocca&ac=1

Figure 135. Alex Katz. *Ada with Sunglasses.* 1989. Oil on masonite. Waterville, ME, Colby Museum of Art. Retrieved from http://www.colby.edu/academics_cs/museum/search/Obj4519?sid=14152&x=353657

Figure 136. James Wyeth. *Andy Warhol* (wearing large clear acetate framed glasses). 1976. Pittsburgh, PA, Andy Warhol Museum. Retrieved from http://www.flickr.com/photos/32357038@N08/3307711445/in/set-72157614237669753

Figure 137. Chuck Close. *Self-Portrait.* 2004-2005. Oil on canvas, 102 x 86 in. Collection Walker Art Center, Minneapolis: Art Center Acquisition Fund, 1969. Image used with permission. Retrieve from

http://visualarts.walkerart.org/detail.wac?id=1528&title=past%20exhibitions&style=imag es

Figure 139. D. George Thompson after James William Edmund Doyle. *The Literary Club of 1781.* 1851. Stipple and line engraving. London, National Portrait Gallery. Retrieved from http://en.wikipedia.org/wiki/The_Club_%28Literary_Club%29

Figure 140. Salomon Koninck. *A Philosopher.* 1635. Oil on canvas, 17 x 71 cm. Madrid, Museo del Prado. Image by permission of Dr. Emil Krén, Editor of Web Gallery of Art. Retrieved from <u>http://www.wga.hu/frames-</u> e.html?/html/k/koninck/salomon/index.html

Figure 141. Francusco de Goya. *Sketch for the Annunciation.* C. 1785. Oil on canvas, 42 x 26 cm. Boston, Museum of Fine Arts. Courtsey of Chris McCormick, The Athenaeum. Retrieved from http://www.the-athenaeum.org/art/detail.php?ID=30199

Figure 142. Jacopo Robusti Tintoretto. *St. Mary in Egypt* detail. 1582-1587. Oil on canvas. Venice, Scuola Grande di San Rocco. Image by permission of Dr. Emil Krén, Editor of Web Gallery of Art. Retrieved from http://www.wga.hu/index1.html (Search Tintoretto and Mary.)

Figure 143. Quint Buchholz. *The Journey.* 1987. Unknown media. Artist's collection. Image used with permission. Retrieved from http://www.quintbuchholz.de/en/pictures/1983-1990.html

Figure 144. Frank W. Benson. *The Reader.* 1910. Oil on canvas, 64.14 x 76.84 cm. Private collection. Courtsey of Chris McCormick, The Athenaeum. Retrieved from http://www.the-athenaeum.org/art/detail.php?ID=25137

Figure 145. Atanur Dogan. *Old Man Reading a Book.* 2011. Watercolor, 50 x 70 cm. Artist's Collection. Photograph courtesy of artist. See the Dogan demonstrating the actual painting of this work on September 13, 2011, at http://www.facebook.com/media/set/?set=a.266953626658840.65174.148017685219102 & http://www.facebook.com/media/set/?set=a.266953626658840.65174.148017685219

Figure 146. Scriptorium. Cloister of Battle Abbey as it might have appeared in the late 13^{th} century. 1995. Color drawing. Image courtesy of © English Heritage Photo Library. See

http://www.englishheritageimages.com/english_heritage_images/print/5793333.html

Also see the Victoria and Albert Museum website: http://www.vam.ac.uk/content/articles/m/medieval-monasteries/

Figure 147. St. Thomas Aquinas in *Super quarto libro sententiarum.* 1484. Illuminated manuscript. Naples, Bibliotheca Nazionale, MS. VII. B. 4c, fol. 13r. Scanned from Becket, 1998, p. 63.

Figure 148. Rembrandt van Ryn. *Scholar Reading.* 1631. Oil on canvas, 60 x 48 cm. Stockholm, Nationalmuseum. Retrieved from : http://www.wikipaintings.org/en/rembrandt/philosopher-reading-1631

Figure 149. Johannes Vermeer. *Lady Writing a Letter with her Maid.* 1670-1672. Oil on panel, 72.2 x 59.7 cm. Dublin, National Gallery of Ireland. Image by permission of Dr. Emil Krén, Editor of Web Gallery of Art. Retrieved from (1661-1670, Page 4) http://www.wga.hu/frames-e.html?/html/v/vermeer/index.html

Figure 150. John Koch. *Woman Reading a Newspaper.* 1975. Oil on canvas. Unknown owner. Retrieved from Corbis Images website: <u>http://www.corbisimages.com/Search#q=John+Koch&ac=John+Koch&cat=21,20,17&mt=1&cf=1</u>

Figure 151. Eastman Johnson. *Boyhood of Lincoln.* 1868. Ann Arbor, University of Michigan Museum of Art. Oil on canvas, 46.42 x 37.32 in. Retrieved from http://www.flickr.com/photos/trialsanderrors/3374732369/

Figure 152. Solomon Alexander Hart. *An Early Reading of Shakespeare.* 1838. Oil on canvas, 90.2 x 69.8 cm. Private Collection. Image courtesy of the Art Renewal Center, Fred Ross, Chairman. Retrieved from http://www.artrenewal.org/pages/artwork.php?artworkid=5340&size=large

Figure 153. Jan Cornelisz Vermeyen. *St. Jerome Meditating.* 1525-1530. Oil on panel, 38 x 47 cm. Paris, Musée du Louvre. Image by permission of Dr. Emil Krén, Editor of Web Gallery of Art. Retrieved from <u>http://www.wga.hu/frames-</u>e.html?/html/v/vermeyen/index.html

Figure 154. Deer fat oil lamp. Magdalenian culture, 17,000 BP (carbon dating). Red sandstone, 8 ³/₄ in long. Found in Lascaux Cave in Montignac, Dordogne, Aquitaine, France. Viewed in Musée National de Préhistoire aux Eyzies-de-Tayac. Retrieved from http://commons.wikimedia.org/wiki/File:Lampe a graisse - Lascaux.png

Figure 155. Impression of cave painting with stone lamps. n.d. Drawing. Scanned from O'Dea, 1958, p. 32.

Figure 156. Michelangelo. 1508-1512. *Erythrean Sibyl #17* detail of torch and saucer lamp. Fresco. Sistine Chapel. Vatican, Rome. Retrieved from http://en.wikipedia.org/wiki/File:Michelangelo_Buonarroti_033.jpg

Figure 157. Ancient Greek clay oil lamp 2500 Y/O. C. 400 BCE. Convex top, 3 ". Retrieved from <u>http://www.liveauctioneers.com/item/8762931</u>

Figure 158. Roman open oil lamp with gladiators. n.d. Koln, Germany, Romisch-Germanisches Museum. Retrieved from <u>http://en.wikipedia.org/wiki/File:RGM_120-1.jpg</u>

Figure 159. Roman bronze oil lamp used in upper class households. C. 200-400 CE. Width 5.6 cm, length 10.9 cm, height 4.2 cm. Retrieved from Et Tu Antiquities, Oil Lamps website: <u>http://ettuantiquities.com/oil_lamps_thumbnails_1.htm</u>

Figure 160. Roman double-spouted lamp with Fortuna in the concave discus. Mid-1st century CE. Mouldmade pottery, length 21.3 cm. Retrieved from the Ancient Resource, LLC website:

http://www.trocadero.com/ancientresourcellc/items/1048254/item1048254.html

Figure 161. Pierre-Paul Prud'hon. *Minerve Lights the Way for the Arts and Sciences* with hand-held metal wick channel lamp. Fourth quarter of 18th century to the 1st quarter of the 19th C. Oil on canvas, 14 x 18 cm. Dijon, Musée des Beauz-Arts. Retrieved from http://www.culture.gouv.fr/Wave/image/ /0332/m013704_0008505_p.jpg

Figure 162. Grave digger with hanging spike oil lamp. 3rd-4th century CE. Early Christian Fresco. Rome, Italy, Catacomb of Saints Marcellinus and Peter. Art Resource, ART87054. See at Art Resource website:

http://www.artres.com/C.aspx?VP3=ViewBox&VBID=2UN365VSRUJ&VBIDL=&AT =Image

Figure 163. Claude-Henre Watelet. *Old Philosopher seated, reading a large book* with hanging open lamp. 1786. Engraving, 19.2 x 14.6 cm. San Francisco, De Young Fine Arts Museums. Retrieved from <u>http://deyoung.famsf.org/search-collections</u>

Figure 164. Detail of author (Burchard) writing on bifolium with wall niche oil lamp in *Lives of St. Edmund and St. Fremund* by John Lydgate. 1434-1439. Illuminated manuscript. London, British Library, MS. Harley 2278, fol. 74r. Courtesy of © British Library Board. Retrieved from

http://www.bl.uk/catalogues/illuminatedmanuscripts/ILLUMIN.ASP?Size=mid&IIIID=1 5579

Figure 165. Charles Louis Müller. *The Study and Inspiration* with Roman lampstand. 1864. Oil on canvas, 92 x 52 cm. Paris, Musée du Louvre. Image used with permission of © Musée du Louvre. Retrieved from

http://www.culture.gouv.fr/Wave/image/joconde/0022/m503604_91de2908-2_p.jpg

or

http://cartelfr.louvre.fr/cartelfr/visite?srv=car not frame&idNotice=5879&langue=fr

Figure 166. Gerbrand van den Eeckhout. *Scholar with his books* with multi-burner metal hanging lamp. 1671. Oil on canvas, 64.5 x 49 cm. Budapest, Museum of Fine Arts. Retrieved from

http://commons.wikimedia.org/wiki/File:Gerbrand_van_den_Eeckhout_-Scholar with his Books - WGA7468.jpg

Figure 167. Example of floating-wick Roman vase lamp, late period. 4rd century CE. Glass, 8 5/8 in diameter, folded in flared rim. Boca Raton, FL, Griffin Gallery Ancient Art. Image used with permission of Griffin Gallery Ancient Art. Retrieved from http://www.griffingallery.net/items/963761/en2store.html

Figure 168. Saint Luke with adjustable hanging vase lamp from the *Constantinople New Testament*, Gospel of Luke 1. Mid-10th century. Illuminated manuscipt. London, British Library, BL Add. 28815, fol. 76v. Courtesy of © The British Library Board. Retrieved from <u>http://www.bl.uk/onlinegallery/sacredtexts/constantinople_lg.html</u>

Figure 169. A Hazzan in a Spanish Synagogue reading the Haggadah under hanging float-wick oil lamps in *Sister Haggadah.* C. 1350. Illuminated manuscript. Vellum, 23.3 x 19 cm. London, British Library, Or. MS. 2884, fol. 17v. Courtesy of © The British Library Board. Retrieved from

https://imagesonline.bl.uk/en/asset/show_zoom_window_popup_img.html?asset=11840

Figure 170. Liturgical chanting beneath three lamps suspended from an arcade in the *Windmill Psalter* in initial C. 1280-1300. Illuminated manuscript. Vellum, 320 x 215 mm. New York, The Pierpont Morgan Library, MS M. 102, fol. 100r. Retrieved from http://utu.morganlibrary.org/medren/single_image2.cfm?imagename=m102.100ra.jpg&p age=ICA000004387

Figure 171. Georges de La Tour. *Magdalene with the Smoking Flame* and detail of float-lamp. C. 1640. Oil on canvas, 117 x 92 cm. Los Angeles County Museum of Art. Image by permission of Dr. Emil Krén, Editor of Web Gallery of Art. Retrieved (page 1) from http://www.wga.hu/frames-e.html?/html/l/la tour/georges/index.html

Figure 172. Drawing of Egyptian hieroglyph of a possible floating-wick lamp. C. 1353 BCE. Drawing by Sarah Dowhower of a depiction represented in Robins, 1939, p. 45.

Figure 173. Cresset-stone lamp with four cups. No older than 1172. Purbeck Marble, 9 ¹/₂ x 7 ¹/₂ x 5 in deep. Dorset, England, Bindon Abbey [now in Holy Rood Church, Wool]. Image used with permission of photographer David Day. Retrieved from http://people.bath.ac.uk/lismd/dorset/wool/fryer-1898.html *Figure 174.* Crusie Lamp. n.d. Used by permission of Beth Maxwell Boyle. Retrieved from the Rams Horn Studio Early Lighting 2 website by: http://www.ramshornstudio.com/early_lighting_2.htm

Figure 175. Phoebe Lamp. Late 18^{th} -early 19^{th} century. Celtic cast iron double bowl design, height $12 \frac{1}{4}$ in., bottom bowl $2 \frac{1}{8} \times 4 \frac{1}{4}$ in. Used by permission of Hal Post. Retrieved from the Hals Lamp Post website:

http://www.halslamppost.com/Miscellaneous%20Lamps/slides/Double%20Crusie%20Oil %20Lamp.html

Figure 176. Betty Lamp with cover. Sheet steel. German and used by H. C. Kempt, Potter. Retrieved from The Old Time Lamp Shop website, Jamie Jones, Curator: http://collectlamps.com/fat%20betty%20lamps.html

Figure 177. Govanni Girolamo Savoldo. *St. Matthew and the Angel* and detail. 1534. Oil on canvas, 93 x 125 cm. New York, The Metropolitan Museum of Art. Image by permission of Dr. Emil Krén, Editor of Web Gallery of Art. Retrieved from http://www.wga.hu/frames-e.html?/html/s/savoldo/index.html

Figure 178. Trophime Bigot. *Young girl pouring oil into a lamp.* 1650. Oil on canvas. Rome, Galleria Doria Pamphili. Image in black and white with permission of Galleria Doria Pamphili. See in color at <u>http://www.bridgemanart.com/image/Bigot-Trophime-c-1595-p-1650/Girl-pouring-oil-into-a-lamp-oil-on-canvas/07124988b4254580809e15e2b7f55f19</u>

Figure 179. Frontispiece with Rabbi Gamaliel and students in the *Sarajevo Haggadah*. C. 1350. Illuminated manuscript in copper and gold. Vellum. Sarajevo, National Museum of Bosnia and Herzegovina. Retrieved from Klawans (2010): http://thechristianity.wordpress.com/2010/03/31/was-jesus%E2%80%99-last-supper-aseder/

Figure 180. Monk Sabas reads (with taper) to the Emperor Nicephorus III in the *Homilies of John Chrysostom.* 1071-1081. Illuminated manuscript, tempera and gold on vellum. Bibliotheque Nationale de Paris, MS. Coislin 79, fol. 1 (2 bis)r. Retrieved from http://commons.wikimedia.org/wiki/File:Nicephorus_III_and_Sabas_BnF_Coislin79_fol_2bis.jpg

Figure 181. Office for the Dead at Vespers, Requiem Mass in the *The Hours of the Umfray Family.* C. 1420. Iluminated manuscript. Parchment, 200 x 140 mm. London, British Library, Sloane 2468, fol. 115. Courtesy of © The British Library Board. Retrieved from

http://www.bl.uk/catalogues/illuminatedmanuscripts/ILLUMIN.ASP?Size=mid&IllID=6 554

Figure 182. Sébastien Bourdon. *Presentation in the Temple.* C. 1644. Oil on canvas, 71 x 61 cm. Paris, Musée du Louvre, Paris. Retrieved from

Figure 183. Charles Spencelayh. *The Last Night of Hanukkah.* Before 1958. Oil on canvas. Private Collection. Retrieved from <u>http://www.linneoart.com/blog/?cat=23</u>

Figure 184. Asaf al-Daula. *The Muharram Festival in Lucknow:* Listening at night to the maulvi reading from the scriptures. India, Nawab of Oudh. C. 1795. London, British Library. Retrieved from <u>http://en.wikipedia.org/wiki/File:Asif_muharram_1795_1.jpg</u>

Figure 185. Barthel (Bartholomäus) Bruyn The Elder. *Vanitas Still Life.* 1524. Oil on wood, 61 x 51 cm. Otterlo, Rijksmuseum Kröller-Müller. Retrieved from http://commons.wikimedia.org/wiki/File:Barthel_%28Bartholom%C3%A4us%29_Bruyn - Vanitas.JPG

Figure 186. Rembrandt. *Student at a Table by Candlelight.* 1642. Copper etching, 14.8 x 13.5 cm. Boston, Museum of Fine Arts. Retrieved from http://www.wikipaintings.org/en/rembrandt/student-at-a-table-by-candlelight-1642

Figure 187. Josef Israëls. *The Philosopher* (An Old Man Writing by Candlelight). 1885-1899. Oil on canvas, 65 x 54.6 cm. London, National Gallery. Image used with permission. Retrieved from <u>http://www.nationalgallery.org.uk/paintings/jozef-israels-an-old-man-writing-by-candlelight</u>

Figure 188. Gerard Dou. *Astronomer by Candlelight.* Late 1650s. Oil on panel, 12 5/8 x 8 3/8 in. Los Angeles, J. Paul Getty Museum. Retrieved from http://cgfa.acropolisinc.com/dou/p-dou30.htm

Figure 189. Jan van der Meer van Utrecht. *Singing Couple.* Before 1697. Oil on canvas, 79 x 63.5 cm. Private Collection. Retrieved from http://commons.wikimedia.org/wiki/File:Jan_van_der_Meer_-_Singing_Couple.jpg

Figure 190. Matthias Stomer (Stom). *Young Man Reading by Candlelight.* Before 1649. Oil on canvas. Stockholm, National Museum. Retrieved from <u>http://uk.wikipedia.org/wiki/%D0%A4%D0%B0%D0%B9%D0%BB:Matthias_stom_yo</u>ung man reading by candlelight.jpg

Figure 191. Hendrick Terbrugghen. *Old Man Writing by Candlelight.* 1623-1627. Oil on canvas, 65.7225 x 52.705 cm. Northampton, Smith College Museum of Art. Image used with permission. Retrieved from http://museums.fivecolleges.edu/detail.php?museum=all&t=objects&type=all&f=&s=Terbrugghen&record=0

Figure 192. French School. *Portrait of a Man by Candlelight.* 18th century. Oil on canbas, 61.6 x 50.8 cm. Originally owned by Cleveland Museum of Art; sold in Sotheby

Auction, 2011, Lot 41. Owner unknown. Retrieved from http://www.mutualart.com/Events/Auctions/Old-Master---19th-Century-European-Art/74157FB838B13453/AuctionResults

Figure 193. Joseph Wright of Derby. *A Young Girl Reading a Letter with an Old Man Reading over her Shoulder.* 1767-1770. Oil on canvas, 76.5 x 63.5 cm. Private Collection. Retrieved from

http://commons.wikimedia.org/wiki/File:Joseph_Wright_of_Derby. A_Young_Girl_Rea ding_a_Letter,_with_an_Old_Man_Reading_over_Her_Shoulder._c._1767-70.jpg

Figure 194. Johann Monles Culvershouse. *Reading the News.* 1860. Oil on canvas, 50.48 x 75.57 cm. Private Collection. Courtsey of Chris McCormick, The Athenaeum. Retrieved from <u>http://www.the-athenaeum.org/art/full.php?ID=16615</u>

Figure 195. William Hogarth. *The Politician (Shortsighted Man).* 1775. Engraving. Inscribed on plate is: "Will.m Hogarth, Inv.t. Etch'd by J. K. Sherwin. Etch'd from an Original Sketch of Wm. Hogarth's, in the Possession of Mr. Forrest. Pub'd as the Act direct by Jane Hogarth, Oct. 31st, 1775." Paper, 18.5 x 14.8 in. Image used with permission. Retrieved from Darvill's Rare Prints website: http://www.darvillsrareprints.com/Hogarth%20The%20Politician.htm

Figure 196. J. H. Clark. *Shooting the Harpoon at a Whale.* C. 1814. Colored engraving. Unknown owner. Retrieved from http://en.wikipedia.org/wiki/File:Shooting the Harpoon at a Whale - J.H. Clark.png

Figure 197. Georg Friedrich Kersting. *Man Reading by Lamplight* with a French Bouillotte lamp. 1814. Oil on canvas, 48 x 37 cm. Winterthur, Oskar Reinhart Collection. Retrieved from http://commons.wikimedia.org/wiki/File:Georg_Friedrich_Kersting_-Man Reading at Lamplight - WGA12122.jpg

Figure 198. Argand central glass chimney lamp. n.d. Drawing. German. Retrieved from <u>http://commons.wikimedia.org/wiki/File:Argand01.jpg</u>

Figure 200. Georg Friedrich Kersting. *The Elegant Reader* with an Argand lamp. 1812. Oil on canvas, 47.5 x 37.5 cm. Weimar, Schlossmuseum. Retrieved from *http://commons.wikimedia.org/wiki/File:Kersting_-_Der_elegante_Leser.jpg*

Figure 201. John Fredrick Peto. *Still Life with Book, Lard Lamp, Pipe, and Match.* Early 19th century. Oil on board, 22.86 x 15.24 cm. Private Collection. Courtsey of

Chris McCormick, The Athenaeum. Retrieved from <u>http://www.the-athenaeum.org/art/full.php?ID=14371</u>

Figure 202. Samuel Finley Breese Morse. *Portrait of Noah Webster.* Before 1872. Oil on canvas, 84.7 x 72.7 cm. New Haven, CN, Beinecke Rare Book & Manuscripts Library, Yale University. Retrieved from http://commons.wikimedia.org/wiki/File:Portrait of Noah Webster.jpg

Figure 203. Noah Webster's lard oil lamp: One of a pair used to compile his dictionary. 1941. Photo. In Flashback: Lamps and illuminants by Eugene Clute originally published in the September 1941 issue of *American Collector Magazine*. Image used with permission. Retrieved from *American Collector Weekly* Archive website of March 26th, 2009: http://www.collectorsweekly.com/articles/lamps-and-illuminants/

Figure 204. John Graham Gilbert. *William Murdoch (Murdock).* Before 1866. Reproduction of the original portrait, 10.4 x 8.1 cm. Birmingham, UK, City Museum and Art Gallery. Retrieved from http://en.wikipedia.org/wiki/File:William Murdoch %281754-1839%29.jpg

Figure 205. Paul- Gustave Dore and Blanchard Jerrold. Scripture Reader in a Night

Figure 205. Paul- Gustave Dore and Blanchard Jerrold. *Scripture Reader in a Night Refuge* (Poor House) from *London: A Pilgrimage.* 1872. Engraving. Retrieved from http://www.cf.ac.uk/encap/skilton/illustr/Dore143.html

Figure 206. Richard Carlton Woodville. *Politics in an Oyster House.* 1848. Oil on canvas, 40.6 x 33 cm. London, Walker Art Gallery. Courtsey of Chris McCormick, The Athenaeum. Retrieved from <u>http://www.the-athenaeum.org/art/full.php?ID=20768</u>

Figure 207. Mary Cassatt. *Under the Lamp.* C. 1882. Soft-ground etching and aquatint in black on cream wove paper, 192 x 218 mm. Chicago, Institute of Art. Retrieved reproduction from <u>http://en.wahooart.com/A55A04/w.nsf/Opra/BRUE-8BWURH</u>

Figure 208. Sir William Orchardson. *Her Mother's Voice.* 1888. Oil on canvas, 1016 x 1486 mm. London, Tate Gallery. See at the Tate Gallery at http://www.tate.org.uk/servlet/ViewWork?cgroupid=999999961&workid=10956&search_id=13539

Figure 209. Marc Chagall. *The Smolensk Newspaper.* 1914. Oil and graphite on paper mounted on canvas, 37.9 x 50.2 cm. Philadelphia Museum of Art. Retrieved from http://www.wikipaintings.org/en/marc-chagall/the-smolensk-newspaper-1914

Figure 210. Pierre Bonnard. *Under the Light of the Lamp.* 1899. Oil on cardboard, 34 x 44 cm. Paris, Musee d'Orsay. Retrieved from Ciudad de la Pintura website: http://pintura.aut.org/SearchProducto?Produnum=19307 *Figure 211.* Cleveland study lamp. Signed & Patent Dated 1863-1871-1873. Nickel over brass. Photo retrieved from the Richard Miller Lamp site: http://richardmillerlamps.com/studentlamps.htm

Figure 212. Paul Signac. *Woman with Lamp.* 1890. Oil on wood, 0.261 x 0.166 m. Paris, Musée d'Orsay (RF 1976 78). Donation of Mrs. Ginette Signac, 1976. Used with permission. Retrieved from <u>http://www.musee-orsay.fr/en/collections/index-of-works/resultat-</u>

collection.html?no_cache=1&zoom=1&tx_damzoom_pi1%5Bzoom%5D=0&tx_damzoo m_pi1%5BxmlId%5D=003019&tx_damzoom_pi1%5Bback%5D=en%2Fcollections%2F index-of-works%2Fresultat-collection.html%3Fno_cache%3D1%26zsz%3D9

Figure 213. Peter Vilhlem Ilsted. *Little Girl Reading and Knitting.* C. 1913. Color Mezzotint, 13 ¹/₄ x 11 5/8 in. Retrieved from Kodner Auction Catalogue #44 for 5/12/2010 website: <u>http://www.kodner.com/catalogue/051210/catalogue1.html</u>

Figure 214. The Rochester. 1891. Newsprint, 6 x 15 cm. Advertisement for The Rochester Lamp Co. Photographer, Sarah Dowhower.

Figure 215. Harriet Backer. *By Lamplight.* 1890. Oil on canvas, 64.7 x 66.5 cm. Bergen, Norway, Kunstmuseum. Image courtesy of Mark Harden, Artchive Web Gallery. Retrieved from <u>http://www.artchive.com/web_gallery/H/Harriet-Backer/By-Lamplight-1890.html</u>

Figure 216. Knut Ekvall. *The Reading Lesson.* 1912. Oil on panel, 60.2 x 75.5 cm. Private Collection. Image courtesy of the Art Renewal Center, Fred Ross, Chairman. Retrieved from

http://www.artrenewal.org/pages/artwork.php?artworkid=10928&size=large

Figure 217. Pablo Picasso. *Portrait of Joseph Cardona.* 1899. Oil on canvas, 100 x 63 cm. Paris, Collection of Alex Maguy. Retrieved from Ciudad de la Pintura website: http://pintura.aut.org/SearchProducto?Produnum=28790

Figure 218. Pablo Picasso. *Still Life with Skull (Crane), Book, and Oil (Petroleum) Lamp.* 1946. Oil on plywood, 54 x 65 cm. Lyon, Beau-arts de Lyon Musée. Retrieved from http://www.wikipaintings.org/en/pablo-picasso#supersized-still-life-223843

Figure 219. Juan Gris. *Still Life with an Oil Lamp.* 1911-1912. Oil on canvas, 48 x 33 cm. Otterlo, Netherlands, Kröller-Müller Museum. Retrieved from http://www.wikipaintings.org/en/juan-gris/still-life-with-oil-lamp-1912

Figure 220. Joan Miro. *The Kerosene Lamp.* 1924. Charcoal with red Conte and colored crayons, white oil paint on canvas, 810 x 1003 mm. Chicago, Institute of Art. Photo used with permission of photographer, Mingqi Ge. Retrieved from http://www.flickr.com/photos/noctilux-mingqi/5410159933/

Figure 221. Quint Buchholz. *Book Lighthouse.* 1992. Oil on canvas. Artist's Collection. Image used with permission of artist. Retrieved http://www.quintbuchholz.de/en/pictures/1991-2000.html

Figure 222. Benjamin West. *Benjamin Franklin, Drawing Electricity from the Sky.* C. 1816. Oil on canvas, 34 x 25.6 cm. Philadelphia, Museum of Art. Retrieved from http://commons.wikimedia.org/wiki/File:Franklinwithkey.jpg

Figure 223. Craigside House, Newcastle, Northumberland, UK. 2005. Photo by Glen Bowman and retrieved from <u>http://en.wikipedia.org/wiki/File:Cragside1.jpg</u>

Figure 224. Sir William Armstrong in his Study. 1881. Illustration in the *Graphic Newspaper*, London. The image is reproduced in *William Armstrong, Magician of the North* by Henrietta Heald (Northumbria Press, 2010). Image used with permission. Retrieved from http://www.williamarmstrong.info/science

Figure 225. Abraham Archibald Anderson. *Thomas A. Edison.* 1890. Oil on canvas, 114.3 x 138.7 x 2.5 cm. Washington DC, National Portrait Gallery. Image used with permission of photographer David Cowhig. Retrieved from http://www.flickr.com/photos/74568056@N00/5892776241/

Figure 226. John Sloan. The *New Homestead.* 1930. Tempera and oil on panel, 24 x 32 in. New York, Gerald Peters Gallery and Kraushaar Galleries. Photo courtesy Gerald Peters Gallery and Kraushaar Galleries, New York, NY. Retrieved from <u>http://www.gpgallery.com/works/view/2565/206/0/0/0/0/0/0/1/9</u>

Figure 227. Frank Weston Benson. *The Camp.* 1925. Oil on canvas, 55.9 x 71.1 cm. Private Collection. Image courtesy of the Art Renewal Center, Fred Ross, Chairman. Retrieved from

http://www.artrenewal.org/pages/artwork.php?artworkid=39626&size=large

Figure 228. Han-Wu Shen. 2007. *Quiet Night.* Oil on canvas, 71 x 91 cm. Collection of Akshay Sanghavi. Image courtesy of the Art Renewal Center, Fred Ross, Chairman. Retrieved from

http://www.artrenewal.org/pages/artwork.php?artworkid=38378&size=large

Figure 229. Pablo Picasso. Reading at a Table. 1934. Oil on canvas, 162.2 x 130.5 cm. New York, The Metropolitan Museum of Art. Retrieved from http://www.metmuseum.org/works_of_art/collection_database/modern_art/reading_at_a_table/objectView.aspx?&OID=210006954&collID=21&vw=0

Figure 230. Norman Rockwell. *And Daniel Boone Comes to Life on the Underwood Portable* detail. 1923. Oil on canvas. Private Collection of Steven Spielberg. The painting is the first Rockwell purchased by Spielberg. Retrieved from

http://newsdesk.si.edu/photos/norman-rockwell-and-daniel-boone-comes-lifeunderwood-portable

Figure 231. Roy Lichtenstein. *Still Life with Lamp.* 1976. Oil and magna on canvas, 54 x 74 inches. Private Collection. Image courtesy of Mark Harden, Artchive Web Gallery. Retrieved from http://www.artchive.com/artchive/L/lichtenstein/lichtenstein_lamp.html

Figure 232. Janet Fish. *Barry (The Poet).* 1982. Oil on canvas, 60 x 65 cm. Private Collection. Image permission © Janet Fish/Licensed by VAGA, New York, NY. <u>www.vagarights.com</u>. Retrieved from <u>http://www.askart.com/AskART/artists/search/Search_Repeat.aspx?searchtype=IMAGE</u> S&artist=34511

Figure 233. Deborah DeWit Marchant. *Evenings at Home.* 2005. Private Collection. Image courtesy of the artist. See at <u>http://www.simplemindscards.com/Readers.html</u>

Figure 234. Deborah DeWit Marchant. *Friday Nights.* 2006. Pastel, 22 x 26 in. Private Collection. Image courtesy of the artist. See at

http://www.deborahdewit.com/index.php/image-detail?fID=53

Figure 235. Jan Steen. *Rhetoricians at a Window.* 1661-1666. Oil on canvas, 75.9 x 58.6 cm (according to PMA). Philadelphia Museum of Art. Retrieved from http://commons.wikimedia.org/wiki/File:Steen_Rhetoricians_at_a_Window.jpg

Figure 236. Gerrit van Honthorst. *Old Woman Examining a Coin by Lantern.* 1623. Oil on canvas, 75 x 60 cm. The Kremer Collection. Image courtesy of George Kremer. See at <u>http://www.thekremercollection.com/art/artists/Gerrit-van-Honthorst/Old-woman-</u>examining-a-coin-by-a-lantern-%28Sight-or-Avarice%29/

Side Bars

- Side Bar 1: Struggling to See Text: 3 Major Vision Problems
- Side Bar 2: Dioptric Correction vs. Magnification
- Side Bar 3: Myopia Mystique
- Side Bar 4: Single Lens Challenge
- Side Bar 5: Bespectacled Women
- Side Bar 6: The Bigger the Better
- Side Bar 7: Tinted Tidbits
- Side Bar 8: Jerome, the Anachronism Icon

Side Bar 9: The White Wall Effect

Side Bar 10: Awesome Slide Shows

Side Bar 11: Jefferson's Spectacle Innovations

Side Bar 12: Age-Old "Do-It-Yourself" Spectacle Fitting

Side Bar 13: Fictional Characters with Glasses—Here Are the Rules

Side Bar 14: Light Was Work!

Side Bar 15: Vanitas Candles

Side Bar 16: Lighting the Light

Side Bar 17: BThe Non-Explosive Lamp Company

Acknowledgements

I would like to thank Roseanne Worrell for the many hours of proofing and editing she put into this manuscript. What an eagle eye for typos and tense issues!

I also would like to convey my appreciation to Dr. David Fleishman curator of the wonderful online museum and encyclopedia, *Antique Spectacles & Other Vision Aids* at <u>http://www.antiquespectacles.com/</u> Without the information, resources, and images he provided personally and at his website, <u>and</u> Dr. Fleishman's expert advice and input, I would not have been able to provide such a comprehensive history of vision aids.

Most of all, there are no words to express my gratitude to my husband Craig Edwards for all his editing suggestions and extreme tolerance and patience through the writing and editing process. I even forgive him for accidently not backing up my desktop files!

Fine J. C. & Miller, Lynne D. (2011). Adolescents' developing literacy: What's the use of technology? *American Reading Forum Annual Yearbook* [Online], Vol. 31.

Adolescents' Developing Literacy: What's the Use of Technology?

Joyce C. Fine Florida International University

Lynne D. Miller Florida International University

When an area superintendent for curriculum in a large urban school district called for assistance with a failing, predominantly Haitian high school that was now one of "her" schools, Dr. Fine, one of the authors, gladly agreed to a meeting. After discussing possibilities at the area level, there was enthusiastic encouragement to bring a literacy practicum course to the school. This arrangement offered a chance to expand the master's in Reading Education program to a population that was quite different from the diverse Hispanic and African American ethnicities of our candidates and of the school populations with whom we had been working.

Subsequent meetings at the high school also met with favorable responses and the school administration and faculty were very supportive of developing a partnership. The University provided master's candidates, who were participating in a practicum focused on adolescent literacy, as tutors. These candidates were all state-certified teachers at either the elementary or secondary level and were near the completion of their K-12 master's degree in a Reading Education program. The high school provided the use of facilities for tutoring and the school's administration arranged to provide dinner to their participating students who were identified for intervention. When bringing the adolescent reading practicum to a new site, efforts are made to identify and include learning experiences that are relevant to the age, interests and backgrounds of the students. The high school described many of the participating students as marginalized and relatively newly-arrived immigrants from lower socio-economic backgrounds who were at various stages of English language acquisition and development.

Experience from successful adolescent practicum at other sites prompted plans to incorporate technology as an important instructional element. However, the school was unable to provide information about students' personal knowledge and use of technology. Would the literacy tutoring be introducing technology to the participating students or would the tutors be able to build on the students' established knowledge of, access to, and use of technology? The purpose of this article is to share the information that was learned about the personal knowledge of and use of technology by these newly arrived, immigrant students. By way of a survey instrument, the literacy professors were able to investigate the practicum students' use of technology and that of students from other schools who were also low-performing as designated on state tests.

Background of the Investigation

This adolescent literacy program, the Reading Scene, is founded on the social theories for learning as described by Vygotsky (1987), a socio-cultural theoretical framework of identity (Gee, 2000) and the relationship of identity to learning in the classroom (McCarthey, 2002). Students participate in one hour of diagnostic teaching and one hour of social interaction using literacy to build intellectual skills (Vygotsky, 1986). The structure emphasizes the importance of engagement, integrating cognitive, motivational and social aspects of reading (Guthrie & Wigfield, 1997). It incorporates leading activities to create a type of Third Space (Gutiérrez, 2008) where there is both play and problem-solving in literacy learning. Through this social environment, it is hoped that students "reconceive who they are and what they may accomplish" (p. 148).

The candidates tutor 1 to 3 students the first hour based upon assessments to determine their strengths and areas for growth. Quality instruction is planned using books and newspaper articles, and popular media, such as magazines and technology (Alvermann, Moon, & Hagood, 1999). The MS candidates evaluate websites for validity and reliability using the guidelines of information technology as well as potential links for matching the needs of the students to the offerings of the site. They then use technology to motivate and to encourage higher-level thinking (Lengel & Lengel, 2006, p.10).

For the second hour, two to four candidates come together with their groups for an hour of collaborative literacy activities that focus on performance and social interaction among the adolescents (Biancarosa & Snow, 2004) to increase engagement. It often involves using print and non-print technology to locate information and materials for a performance. The candidates try to find curricular links and entry points, imagination-captivating materials for students (Brozo, 2005) to initiate a life of literacy (Brozo, 2007). This social interaction helps the students learn that literacy can involve activities that are both challenging and pleasurable. The use of technology is an important aspect because of the increased, integral reliance on it for literacy engagement in the 21st century.

Both hours involve the use of multimedias, print and non-print. The use of technology becomes a critical aspect of the tutoring. The research on the use of technology by adolescents in the United States shows that, in general, it is a comfortable element for learning. These students are of the "Millenial Generation," those born after 1982 or thereabout, who have grown up with technology as an integral part of their lives (Howe & Strauss, 2000). The Pew Internet and American Life Project's study on Teens and Technology (2005, in Mooreman & Horton, 2007) has found that 87% of U.S. teens between the ages of 12 and 17 use the internet. The questions, however, become whether immigrant students who have not grown up in industrialized countries or students who are of low socio-economic backgrounds have had the same or similar access to technology, and, if so, to what degree.

Research Questions

Do the marginalized, low performing students in the Reading Scene and Reading Intervention classes:

- Have access to technology as compared to the adolescents in the data available from Pew (2005)?
- Use technology as compared to the adolescents in the data available from Pew (2005)?

Research Design

An ex post facto research design was used to determine access to and the use of technology by adolescents who were designated as low-performing from standardized tests results. A questionnaire, *Student Technology Inventory* by Moorman and Horton (2007), consisting of 27 questions of which 13 were openended and 14 required yes or no answers, were distributed to high school students in classes for low-performing students. Two of the questionnaire questions had multiple parts. The students self-reported their responses to the

questions. The questionnaires were collected and the data were analyzed for frequency distributions.

Participants

Participants were practicum students at a large high school in an urban area in south Florida, as well as, students in Reading Intervention classes at other urban high schools in the same school district. The students were identified as low-performing based on performance on the state standardized test. Results from participants in the current study were compared to the data from adolescents from across the United States who were in the Pew study (2005).

Data Collection

In addition to those candidates participating in the Reading Scene, the researchers identified candidates who worked in public school settings that have high numbers of marginalized students from diverse and lower socio-economic backgrounds who are at various stages of English language acquisition and development. Selected candidates distributed surveys to their students along with an explanation of the purpose of the study and how the results would be used, including privacy information. Students' completion of the surveys was voluntary.

Students completed the surveys after formal instruction near the end of class. The candidates collected the surveys and returned them to the researchers. Data were collected in classrooms over a period of two weeks.

Data Analysis

Responses to each question on the survey were tabulated. While there were a total of 239 surveys returned, not all students had responded to all items. When relevant, data from the current survey were compared to the data available from Pew (2005).

Results

Results indicate that many of the students in this study have ample access to various types of technology (see Table 1) and regularly spend sizeable amounts of time using it (see Table 2). The first two questions establish that a greater number of students who participated in the survey have a computer (94%) and have access to the internet at home (92%) than the teens who responded in the Pew study (84% and 87% respectfully). The participants in this survey mostly use their computers for word processing (85%) and making PowerPoint presentations (69%), but not for making spreadsheets (35%), creating web pages (28%), or

playing video games on line (38%). While the Pew study did not ask all the same questions, large percentages of the participants in this study use the World Wide Web (91%) as a source of information, email (86%), blog (75%), text message (85%), burn CDs or DVDs (66%), use an Ipod (67%), have a tv in their room (99%), have their own cell phone (90%) and download music for their Ipod (67%) or cell phone (55%). The low-income, marginalized students in this study definitely are active technology users.

Table 1: Access to and Use of Technology

Que	estion	Yes = %	No
1	Do you have a computer? (Pew 2005 – 84%)	226 = 94%	14
2	Do you have Internet access at home? (<i>Pew 2005 – 87%</i>)	221 = 92%	18
3	Is it high speed access?	192 = 80%	44
4	Do you use a computer for word processing?	204 = 85%	35
5	Do you use the computer for spreadsheets?	85 = 35%	153
6	Do you use the computer for PowerPoint presentations?	167 = 69%	72
7	Do you use the computer for creating web pages?	67 = 28%	171
8	Have you used the World Wide Web to find information?	219 = 91%	20
9	Do you have a TV in your own room?	219 = 91 %	17
10	Do you play video games?	155 = 65%	84
11	Do you play video games on line?	92 = 38%	147
12	Do you use e-mail?	207 = 86%	32
13	Do you have a weblog?	181 = 75%	51
14	Do you have a cell phone?	215 = 90%	24
15	Do you use text messaging?	204 = 85%	35
16	Do you have a blackberry?	15 = 6%	222
17	Do you have an Ipod?	161 = 67 %	77
18	Do you download music to your cell phone?	132 = 55 %	105
19	Do you burn your own CDs or DVDs?	158 = 66%	80

 Table 2: Time Using Technology

Question		N	Range	Minimum	Maximum	Mean	St. Dev.
1	How many hours do you spend playing video games daily?	238	12	.00	12	1.2	2.1
22	How many hours do you spend emailing on a typical day?	235	8	.00	8	.84	5.8
3	How many hours per day you spend doing email?	185	8	.00	8	.62	1.5
4	How many hours do you spend on the computer daily?	227	11	.00	11	2.3	2.0
5	How many TVs are in your house?	239	9	1	9	3.9	1.4
6	How many hours do you spend watching TV daily?	237	10	.00	10	3.3	2.4
7	How many hours per day do you spend doing instant messaging?	182	8	.00	8	1.8	2.8
8	How many hours per day do you spend using a cell phone?	186	8	.00	8	4.0	3.4
9	How many hours per day do you spend text messaging?	186	8	.00	8	4.6	3.6

As far as the time spent engaging in these activities is concerned, there is a wide range from not spending much time to spending as much as 11 hours of time on the computer. The median times for the different activities ranges from a little more than half an hour (6.2) to more than four and a half hours (4.6).

Discussion, Implications, Conclusions

The marginalized, low performing students in the Reading Scene and Reading Intervention classes not only have access, but their access is even greater than the access to technology reported by the adolescents in the study conducted by Pew (2005). Their use of technology is also greater. It is possible that the trend is for an increasing use of technology in all segments of the population. Perhaps, during the time lapse between when the Pew (2005) study was done and the current study was conducted, there were overall changes in the general population. The key understanding from this data, however, is not just the comparison to the general population, but rather that the assumption that low-performing, students do not have or use technology is incorrect. The millenials have found ways to get technology even when their overall economic status may be low and they may not have as many economic resources as other adolescents. Some of the access may be on public computers at school or in the libraries. The significance of this study is that one should not jump to the conclusion that the students from low socioeconomic areas do not use or are unfamiliar with

technology. It is important to understand the trends and the goals of secondary students, because they may not be what we as the older generation had or even know. They have reasons for doing different things differently. Therefore, one would be best off talking with students and perhaps, even doing your own survey before beginning to plan instruction to discover the degree to which students are using technology and how this may become the starting point for instruction.

References

- Alvermann, D. E., Moon, J. S., & Hagood, M. C. (1999). Popular culture in the classroom: Teaching and researching critical media literacy. Newark, DE: International Reading Association.
- Brozo, W. G. (2005). Helping students find entry points to literacy. Thinking Classroom/Peremena, 6, 45-46.
- Brozo, W. G. (2007). Helping boys find entry points to lifelong reading: Book clubs and other strategies for struggling adolescent males. In J. Lewis & G. Moorman (Eds.), Adolescent literacy instruction: Policies and Promising Practices (pp. 304-318). Newark, DE: International Reading Association.
- Dillon, S. (2008, March 20). States' data obscure how few finish high school. New York Times. Retrieved March 21, 2008 from http://nytimes.com.
- Gee, J. (2000). Discourse and sociocultural studies in reading. In M. L. Kamil, P. Mosenthal, P.D. Pearson & R. Barr (Eds.), *Handbook of reading research* (Vol. 3, pp. 195-207). Mahwah, NJ: Erlbaum.
- Guthrie, J. T. & Wigfield, A. (1997). Reading engagement: Motivating readers through integrated curriculum. Newark, DE: International Reading Association.
- Gutiérrez, K. D. (2008). Developing sociocritical literacy in the Third Space. *Reading Research Quarterly*, 43(2), 148-164.
- Lengel, J. G. & Lengel, K. M. (2006). Integrating technology: A practical guide. Boston: Pearson.
- McCarthy, S. J. (2002). Students' identities and literacy learning. Newark, DE: International Reading Association.
- Moorman, G. & Horton, J. (2007). Millennials and how to teach them. In J. Lewis & G. Moorman (Eds.), Adolescent literacy instruction: Policies and Promising Practices (pp. 263-282). Newark, DE: International Reading Association.
- Pew Internet and American Life Project. (2005). Retrieved July3, 2006, from http://www.perinternet.org/index.asp
- Vygotsky, L. Thought and Language. (1986). (A. Kozalin, Trans.) Cambridge, MA: The MIT Press. (Original work published 1934)

Fine J. C. & Mosser, P. K. (2011). Celebrating what children comprehend: Using a rubric for written retellings of narrative text. *American Reading Forum Annual Yearbook* [Online], Vol. 31.

Celebrating what children comprehend: Using a rubric for written retellings of narrative text

Joyce C. Fine Florida International University

Pamela K. Mosser Broward County Public Schools

Pam, a tutor in a summer program, is sitting with Mauricio at a table where he is excitedly popping out of the chair. He is talking and waving his hands in the air telling parts of the story, *Stellaluna*. There are lots of details floating in random order as he retells details about the harrowing adventure of the bat. He collects animal stories and is fascinated with the information he extracts from the stories. His teacher knows she has found an entry point for his literacy via his love of animals. Now she thinks, how can I channel this enthusiasm to improve his writing?

As his teacher, she knows that he has the potential to excel with his writing, but he prefers talking and sharing orally what he is learning. When he is asked to write, the enthusiasm drains away. He is no longer eager to share the ideas because it is more difficult to write the words than for him to quickly say them. The effort to write inhibits his putting his thoughts on paper. Yet, his ability to write is going to be assessed the next year when he is in the fourth grade on a standardized test. His skills need development if he is going to develop his writing to match his reading level. If reading and writing develop synchronously (Bear & Barone, 1998), meaning that they both develop at the same rate and that development in one area usually requires there be development in the other, there needs to be an intervention that will scaffold him to develop his writing. The teacher can try several strategies such as recording what he says and then transcribing the story. Seeing his words in print would help him gain confidence in his ability. He might then practice rereading his own words. What else might the teacher use to allow him to monitor his own progress? What worked was a kid-friendly instrument to empower him to be involved with his writing progress.

This paper describes a rubric that allows students to be involved with assessing their own oral or written retellings of stories. The original rubric is designed to evaluate the extent of a student's knowledge of narrative text structure in a written retelling. The article will focus on the analysis of two diverse struggling readers' written retellings, one from a summer literacy program in August and the other from early in the school year, and then both in their classrooms after instructional time was devoted to teaching text structure. It will describe the steps in the instructional process and the next steps for research.

This rubric was created because even though there are checklists for assessing students' ability to retell stories, such as Morrow's (1985) rubric for oral retellings for emergent literacy learners which can be used to assess students knowledge of the elements of narratives, there currently is no valid, reliable instrument for determining student's knowledge of text structure in a written retelling. After considering what teachers could use to collaboratively assess writing with their students, this rubric was devised. In this first stage of research, this rubric is being field tested to determine if it is a viable instrument for classroom teachers to use. Within a writing workshop context, this rubric allows the teacher and the students to gauge developmental progress over time.

The theoretical perspective for the development of this rubric and the concept of collaborating with the student come from a sociocultural perspective. We know that individuals construct meaning via an interaction with the sociocultural environment (Vygotsky, 1978). We also know that the cognitive processes of reading and writing are learned through contextualized activity and assisted learning (Englert & Palincsar, 1991). If students are nurtured in a reading and writing environment, their reading and writing should develop at the same pace. This is known as the Synchronous Model of Literacy Development (Bear & Barone, 1998). By using written retellings (Brown & Cambourne, 1987), teachers can analyze the extent of knowledge of narrative text structure that is present. By using a rubric with the written retelling, they can at the same time, evaluate the student's comprehension and writing. When working with diverse, struggling readers, this information may be used for gathering data for planning both reading comprehension instruction and writing instruction.

The purpose for developing the Rubric (Fine, 2011) was to evaluate oral or written retellings to qualitatively analyze the degree to which narrative elements are present using a quantitative tool to measure growth. (See rubric in Appendix A.) The directions for using the rubric are to quantitatively measure with a score the extent to which narrative elements or characteristics are present. It they are present, the student would get a 1, if partially present, .5, and if not present, 0. The elements have been selected based on both the components of narrative text structure and the characteristics of quality writing.

To begin a trial run with the use of the rubric, a teacher used the rubric with a summer school group of diverse learners at a school that is 1/3 Black, 1/3 Hispanic and 1/3 White with 90% of the students on free and reduced meals. They were asked to evaluate the written retellings to determine 1) the student's knowledge of narrative text structure and 2) the student's areas for growth in writing.

The following is the teacher's description of the instructional methods for this activity:

This assessment consisted of the students listening to a narrative text, The Keeping Quilt or Amazing Grace then writing a retelling of the text. The students' retelling was analyzed using the Fine Retelling Rubric for Narrative Text. After the samples were scored, a plan of instruction was created. The plan consisted of instruction on the narrative elements. Two students who lacked an understanding in specific narrative elements were the focus of this study. The instructional plan consisted of each element being explicitly taught in detail and with examples discussed from within various narrative texts. As the lessons progressed, the students were asked to identify the narrative elements within specific texts. After several weeks of instruction on the elements, including modeling and guided practice, a post assessment, using the book "Stellaluna" was administered. The post-test retellings were also scored using the Fine Retelling Rubric for Narrative Text. The focus students' scores improved. The students' added more elements and details as well as utilized vocabulary from the story within their retellings. One students' score increased by one and one half points and the other students' score increased by four points

Cristian, a low-performing student in third grade, wrote this retelling. (See Figure 1)

3rd Sept. 12 cristian Perez Mary hellen has use this Quilt for years. She went to school but she did not know engilsh. But later she learnd a little bit. But years later her Family use the Quilt for many different things like a table cloth for party and For rap babys, Many Family members use that quilt for many inportant things on even when people go to heven in the family. And Mary hellen made a table cloth

Figure 1. Cristian's September retelling

What does he comprehend from the story? He has some characters. He did not include setting or problem. He knows the quilt is the main thread of the story. He does not say it is a symbol of "back-home" Russia that is an indication that he missed part of the gist. He realizes that English had to be learned which may be evidence of his ability to make personal connections since he, himself, is a second language learner. He does not show evidence of knowing text structure. By looking at the writing and using the rubric with the student one could say that a next step for instruction would be to address two elements, setting and problem, and to teach him to recognize the importance of using sequence or order in the retelling. His score is a 2.5 out of 12. (See Figure 2)

Fine Retelling Rubric for Narrative Text

hristian Sept.

Directions: This rubric may be used to evaluate oral or written retellings of narrative features or elements. If the retelling is oral, teachers might audiotape it to capture what the student says in order to be able to listen closely again or to keep a record of the students' progress in retelling. Teachers might begin with an unaided recall, without any prompts. If the student hesitates, general prompts may be offered, such as, "What happened in the beginning?" to aid students' thinking. Give one point for each, give .5 for partial credit, and 0 if not evident. "The Keeping Quil+"

Category	Qualities	Examples from student retelling	Score
Character	States main character/ other characters if present	Mary Helen for Mary Ellen	.5
Setting	Mentions time and /or place		_0_
Problem	Mentions gist of problem		0
	Has action attempt(s)- related to the problem		_0_
Resolution	Relates to the problem		_0_
Organization	Describes the flow or sequencing of ideas	went to school learned English family used quilt	.5_
Word Choice	Uses appropriate levels of vocabulary for grade and age	family used guilt important	.5
Voice	Shows own personality through the retelling		0_
Sentence Structure	Uses complete sentences	She went to school but she did not Know English.	_i
	Uses some variety of sentences	0	0
Conventions	Uses standard grammar in retelling		_0_
Ideas	Shows creativity, insight into situation		_0_
Total			2.5/12

Figure 2. Cristian's September scored rubric

In November, after instruction in narrative text structure, Cristian was able to retell *Stellaluna* with more detail. (See Figure 3) Grammar is now more of a problem, but the story has more parts indicating better understanding of text structure and greater comprehension. After instruction in text structure, Cristian has a score of 6.5 on the rubric. (See Figure 4)

	3rd Nov.
•	12 Gristian Perez
	stellalung was being cared by
1	attacked mother but and stellalting
	was droped and landed in a birds
like	nest and she thught the birds to be just a deal so the mother hird told
	stellalying to follow the rylesso she
	followed the rules when they got older the birds and stellaluna
1	needed to learn how to fly then she
	Found her mother affer that her friends and she saved them
-	ITTEINS AND SING SUVER INEM

Figure 3. Cristian's November retelling

Fine Retelling Rubric for Narrative Text

Christian 3rd Nov.

Directions: This rubric may be used to evaluate oral or written retellings of narrative features or elements. If the retelling is oral, teachers might audiotape it to capture what the student says in order to be able to listen closely again or to keep a record of the students' progress in retelling. Teachers might begin with an unaided recall, without any prompts. If the student hesitates, general prompts may be offered, such as, "What happened in the beginning?" to aid students' thinking. Give one point for each, give .5 for partial credit, and 0 if not evident.

Category	Qualities	Examples from student retelling	Score
Character	States main character/ other characters if present		_1
Setting.	Mentions time and /or place	landed in a bird's	_ 5_
Problem	Mentions gist of problem	owlattacked mother	
	Has action attempt(s)- related to the problem	bat Estellaluna was dropped glanded mother bird told her to follow rules	
Resolution	Relates to the problem	so she followed the rules	_1
Organization	Describes the flow or sequencing of ideas	being carried, dropped into bird's nest	_1
Word Choice	Uses appropriate levels of vocabulary for grade and age	attacked	.5
Voice	Shows own personality through the retelling		D
Sentence Structure	Uses complete sentences		0
	Uses some variety of sentences Limplied)	When they got older . after that	-5
Conventions	Uses standard grammar in retelling		_0_
Ideas	Shows creativity, insight into situation		0
Total			6.5/12

Figure 4. Cristian's November scored rubric

Another student, Tamar, was asked to write a retelling of *Amazing Grace* by Mary Hoffman. From the writing and the use of the rubric, we see evidence that she comprehends the beginnings of text structure. (See Figure 5.)

Amazing Grace Retelling First When Grace Want to School her techer Squatthere is going Next Eventhe Wahts to be Peter bob Qin a the bots S Provention

Figure 5. Tamar's August retelling

Tamar scored a 7 out of 12 on the rubric for retelling of *Amazing Grace*. (See Figure 6.

Directions: This	rubric may be used to evaluate and	or written retellings of narrative featu	1.09
elements. If the be able to lister begin with an u offered, such as	retelling is oral, feachers might aud a closely again or to keep a record of naided recall, without any prompts. s, "What happened in the beginning?	or written reteilings of narrative featu liotape it to capture what the student s the students' progress in retelling. Te If the student hesitates, general promp to aid students' thinking. Give one pr Amazing Grace "	ays in order to achers might its may be
Category	Qualities	Examples from student retelling	Score
Character	States main character/ other characters if present	Grace went to school	_1
Setting	Mentions time and /or place	when Grace went to School	-,5_
Problem	Mentions gist of problem	boy says Peter Pan boy part/girl says you're	_1
	Has action attempt(s)- related to the problem	Kids try out Grace set her mind to it & got the part	.5
Resolution	Relates to the problem	J	_1_
Organization	Describes the flow or sequencing of ideas	First Next Last	-5
Word Choice	Uses appropriate levels of vocabulary for grade and age	set her mind to it	.5
Voice	Shows own personality through the retelling		_0_
Sentence Structure	Uses complete sentences	When Brace went to school her teacher said, ""	5
	Uses some variety of sentences		_1
Conventions	Uses standard grammar in retelling.	run on sentences	.5
Ideas	Shows creativity, insight into situation		_0_
Total			7 /12

Figure 6. Tamar's August scored rubric.

What should she have been taught next? In November, after instruction in text structure, Tamar is able to write much more. (See Figure 7.)

n Marra bat Intras Finding food came OWL and was An abd 51 drop on to lohaer ecto Stella Luba dosearse de ere \cap C 110 5 Oblh. D Ca 2 VALL C ar habgibgUDSid an n. are CL 11

Figure 7. Tamar's November retelling.

The amount written is evidence of an improved performance. She was able to score 8.5 on the rubric. (See Figure 8).

Fine Retelling Ru	bric for Narrative Text
--------------------------	-------------------------

3rd Nov.

Directions: This rubric may be used to evaluate oral or written retellings of narrative features or elements. If the retelling is oral, teachers might audiotape it to capture what the student says in order to be able to listen closely again or to keep a record of the students' progress in retelling. Teachers might begin with an unaided recall, without any prompts. If the student hesitates, general prompts may be offered, such as, "What happened in the beginning?" to aid students' thinking. Give one point for each, give .5 for partial credit, and 0 if not evident.

Category	Qualities	Examples from student retelling	Score
Character	States main character/ other characters if present	Stellaluna birds motherbat mammabird owi other bats	_1_
Setting	Mentions time and /or place	It was in the forest when mama bat was finding food.	_1
Problem	Mentions gist of problem	owl came - was coming for Mamabat Stellaluna	
	Has action attempt(s)- related to the problem	fellinto birds nest dropped hungry -opened mouth ate insect-had to act like a	_1
Resolution	Relates to the problem	acted like a bird	
Organization	Describes the flow or sequencing of ideas	It was in the Brest Then 3 birds Screamed So She did Went to try out wings	
Word Choice	Uses appropriate levels of vocabulary for grade and age	insect Smelled hanging fruit enough	.5
Voice	Shows own personality through the retelling	0	0
Sentence Structure	Uses complete sentences	run on sentences begins sentences with and on occassion	.5
	Uses some variety of sentences	It was Then An owl When	_1
Conventions	Uses standard grammar in retelling	Then the 3 birds Scremed. All 3 bird went back in the nest actsp stellalman	5_
Ideas	Shows creativity, insight into situation	starsp storestar	_0_
Total			8.5 / 12

Figure 8. Tamar's November scored rubric.

The results show the usefulness of the rubric and the ease with which students strengths and areas for growth are identified and documented by teachers. The students responded positively to being able to monitor their growth.

When using the rubric, in order to compare across students, the rubric would need to be used after the students retell the same texts in writing. Different texts may have narrative elements more or less explicit and may not be retold as easily. An important factor that should also be considered is the differences in students' performance after instruction is impacted by the difference in teacher's ability to deliver quality instruction. The rubric is a tool that in the right hands can bring the student into the collaborative process of teaching and learning to write so that there is a celebration of what students comprehend from both reading and writing.

Some next steps can be envisioned for developing rubrics for writing. There should be a test for inter-rater validity and reliability of the rubric as an instrument for measuring growth in knowledge of narrative text structure. Additionally, a rubric has been developed for oral and written retelling of expository text. This would suggest that there should then be quasi-experimental research with rubrics as instruments for measuring growth in narrative and expository text structure.

References

- Bear, D. & Barone, D. (1998). *Developing literacy: An integrated approach to assessment and instruction*. Boston: Houghton Mifflin.
- Brown, H. & Cambourne, B. (1987). *Read and retell*. Portsmouth, NH: Heinemann Educational Books.
- Englert C. S. & Palincsar, A. S. (1991). Reconsidering instructional research in literacy from a sociocultural perspective. *Learning Disabilities Research and Practice*, 6, 225-229.
- Fine, J. C. (2010). Building Student's Sense of Story through the Storyteller Block Stratedy. In
 J. Richards & C. Lasconde (Eds.). Writing strategies for all primary students: Scaffolding independent writing with 25 differentiated min-lessons. San Francisco, CA: Jossey-Bass.
- Morrow, L. M. (1985). Retelling stories: a strategy for improving children's comprehension, concept of story structures and oral language complexity. *Elementary School Journal*, 85. 647-661.

Children's Books

Cannon, J. (1993). Stellaluna. Orlando, FL: Harcourt, Brace, & Company.

Hoffman, M. (1991). Amazing Grace. NY: Dial Books for Young Readers.

Appendix A

Fine Retelling Rubric for Narrative Text

Directions: This rubric may be used to evaluate oral or written retellings of narrative features or elements. If the retelling is oral, teachers might audiotape it to capture what the student says in order to be able to listen closely again or to keep a record of the students' progress in retelling. Teachers might begin with an unaided recall, without any prompts. If the student hesitates, general prompts may be offered, such as, "What happened in the beginning?" to aid students' thinking. Give one point for each; give .5 for partial credit, and 0 if not evident.

Category	Qualities	Examples from student	Score
Character	States main character/other	retelling	
Character			
~ .	characters if present		
Setting	Mentions time and /or place		
Problem	Mentions gist of problem		
	Has action attempt(s)- related		
	to the problem		
Resolution	Relates to the problem		
Organization	Describes the flow or		
-	sequencing of ideas		
Word Choice	Uses appropriate levels of		
	vocabulary for grade and age		
Voice	Shows own personality		
	through the retelling		
Sentence	Uses complete sentences		
Structure	_		
	Uses some variety of sentences		
Conventions	Uses standard grammar in		
	retelling		
Ideas	Shows creativity, insight into		
	situation		
Total			/ 12

Hiebert, E. H. (2011). Growing capacity with literary vocabulary: The megaclusters framework. *American Reading Forum Annual Yearbook* [Online], Vol. 31.

Growing Capacity with Literary Vocabulary: The Megaclusters Framework

Elfrieda H. Hiebert TextProject & University of California, Santa Cruz

The vocabulary words identified in a core reading lesson on *The Stranger* (Van Allsburg, 1986) are *parlor, draft, frost, terror, fascinated, quaint, timid*, and *etched*. For a week in the English/Language Arts instruction of many fourth-graders, these eight words will provide the focus of vocabulary instruction. Are these the most critical words in the text? Is the approximately 15 minutes of time devoted to each of these words over the week the best use of the scarce instructional time in schools, especially for the students who depend on schools to overcome a huge gap in knowledge and vocabulary?

Over the past decade, questions have been raised about the typical words chosen for instruction within English Language Arts (ELA) programs, where the majority of elementary schoolchildren's formal vocabulary guidance occurs (Nagy & Hiebert, 2010). A primary concern has been that the processes for selecting these words lack any apparent theoretical framework. The words are picked on a story-by-story basis, not on larger units of themes or semantic or morphological relatedness. Within a story, such as *The Stranger* (Van Allsburg, 1986), reasons for the choices of particular words are not clear. In content areas, certain words are employed because of their contributions to a theme. For example, if the words of focus in a science text are *precipitation* and *condensation*, the reader is able to anticipate the content.

Experts often claim that it is impossible to identify a set of words that coalesce within a narrative (Snow, Griffin, & Burns, 2005). On closer examination, however, words exist within *The Stranger* (and the other texts represented above) that are more semantically related than *parlor* and *draft* and that would lead to a richer interaction with the text. Three of the words from the list do share a potential for connections to one another and to the theme of the text: *terror, timid,* and *fascinated*. All three describe aspects of the mysterious stranger who enters the life of the Bailey family: *terror* (the stranger's initial response when hit by the truck), *timid* (when meeting the

other members of the Bailey family), and *fascinated* (his response to seeing steam rising off of food). The text contains other words that further describe responses of the stranger and that are likely to be less familiar but more relevant for vocabulary learning than words such as *parlor* and *draft*. The Baileys wonder if the stranger is a *hermit*. The stranger *shyly tagged along*. The weather becomes very *peculiar*. The stranger is *hypnotized* by a flock of geese heading south. His hand is *trembling* as he holds a green leaf from a tree and he becomes *upset* about the tree's leaves. Connections could be drawn among these words, as well as with some of the focus vocabulary (*terror, timid, fascinated, quaint*). By contrast, a concentration on *parlor* (a tangential reference to a place in the Bailey home) is likely to divert attention from the magnetic pull of the stranger to nature and to his peculiar traits.

A framework for categorizing the vocabularies of narratives is available, but it has been understudied by researchers and underused in pedagogical projects. This framework is the semantic cluster approach (Marzano & Marzano, 1988). I have revisited the underlying constructs of this approach and have refined it as the Vocabulary Megacluster approach. This article has three purposes: (a) an examination of why the Vocabulary Megacluster approach is essential for the development of the vocabulary of narratives, (b) an overview of the Vocabulary Megaclusters, and (c) an application of the Vocabulary Megacluster approach to the texts that were the source for the vocabulary that introduced this paper

Rationale for the Vocabulary Megacluster Approach

Relatively few words in English account for a majority of the total words that are read in text. In English, approximately 100 words account for almost 50% of the total words in text, and approximately 5,500 words account for 80% of the total words (Zeno, Ivens, Millard, & Duvvuri, 1995). Approximately 750,000 words (Leech, Rayson, & Wilson, 2001) account for the remaining 20% of the words in English texts. Most of the words within this last group appear less than once per one million (or even ten million) words.

The common view is that words in informational texts dominate this last group of rare words, not the words in narrative texts. While it is true that the vocabulary of informational texts challenges students, this vocabulary is challenging because it is conceptually complex, not necessarily because the words are rare. Narrative texts are actually more likely than informational texts to have a higher percentage of rare words. One of the reasons for this higher percentage is that the number of *different* rare words is higher in a narrative text. A rare word in an informational text will be repeated, as is the case in an article on thermal energy with vocabulary such as *convection* and *radiation*. In a narrative about a stranger coming into a community, the author will likely use a variety of words to convey the reticence of the character (e.g., *terror, fright, tremble*), rather than repeating the same word over and over. As a result, narrative texts are likely to have more unique rare words.

These features of the vocabulary of narrative texts require an instructional stance that recognizes these differences in kind and number of unique words. I bring to bear three sources of evidence to illustrate the distinctive nature of the vocabulary of narrative text from that of informational text: (a) a comparison of the words highlighted within standards documents for ELA and a content area (science), (b) the results of a study that compared the vocabulary identified for instruction in ELA and science programs, and (c) an analysis of the focus words that introduce this paper as well as of all the words in the texts from which these words came.

Words in standards documents

Evidence for a lack of theoretical or thematic purpose in the selection of words for ELA programs comes from a summary of the vocabulary in standards documents (Marzano, 2004). A list with ten terms from science and ELA vocabulary lists for four different grade bands appears in Table 1. Even with an alphabetic listing rather than a thematic one, it is evident that particular themes underlie the science vocabulary, such as weather in grades K-2 (e.g., *weather pattern, precipitation, thermometer, weather conditions)*. This vocabulary would be expected to appear in texts or materials that students read and use for inquiry.

	ELA	Science
Level 1 (K-2)	alphabet, back cover, consonant blend, folktale, long vowel, number word, purpose, sight word, textbook, vowel combination	air, daily weather pattern, energy, insect, mixture, precipitation, salt water, states of matter, thermometer, weather conditions
Level 2 (3-5)	adjective, common noun, contraction, essay, inference, motive, object, regular verb, tone, word choice	acceleration, conductivity, electrical current, friction, light emission, mass, omnivore, pollution, reproduction, volcanic eruption
Level 3 (6-8)	adverb phrase, business letter, comparative adjective, dialect, figure of speech, historical fiction, jargon, metaphor, relative pronoun, verb phrase	asteroid, chemical element, eclipse, fungus, hydrosphere, lithosphere, muscular system, radiation, sunlight reflection, vertebrate
Level 4 (9-12)	acronym, censorship, denotative meaning, feature article, logographic system, mythology, past perfect verb tense, reflexive pronoun, structural analysis, visual text	biotic components of ecosystems, catalyst, electric potential, genetic mutation, meiosis, ohm, particle emission, radioactive dating, semiconductor, torque, weight of subatomic particles

Table 1. Ten Terms in ELA and Science Standards Documents at Four Grade Bands

The ELA vocabulary is quite different. Vocabulary is represented that fits into particular groups that cut across grade levels, for instance, parts of speech (e.g., *adjective, common noun, relative pronoun*). This vocabulary is likely to be part of teachers' lessons or workbook exercises, but not in the narratives that comprise the core reading programs commonly used in ELA instruction. It is highly unlikely, for example, to find a narrative that uses any of the words that are listed as the ELA vocabulary for grades 3-5 such as *contraction* or *inference*.

A comparison of vocabulary in ELA and content-area texts

A comparison of the words identified for instruction within the ELA and science textbooks, fourth-grade programs, of the same publishers also illustrates the qualities of literary vocabulary (Author & Others, 2011). For the ELA program, publishers had identified 209 words, seven from each selection, for the focus of instruction and assessment. The 207 focus words in the science program were distributed across 19 lessons, each with an average of 11 words. Six features of the 416 words were examined: a) length of words; (b) predicted frequency per one million words of text (Zeno et al., 1995); (c) morphological frequency: the predicted frequency per one million words of text of the words transparently related to the focus word (Zeno et al., 1995); (d) familiarity (Biemiller, 2008; Dale & O'Rourke, 1976); (e) dispersion, which indicates how widely a word appears in different subject areas (Zeno et al., 1995); and (f) conceptual complexity (Nagy, Anderson, & Herman, 1987).

The features of words in narrative and informational texts were statistically different on all measures except for the frequency of morphological families of words and the dispersion index. On three of the remaining four features—length, familiarity, and conceptual complexity—the focus ELA words had averages that classed them as "easier" than the focus science words. On the fourth feature, frequency, the ELA words were deemed harder than the science words, with an average frequency of 14 occurrences per one million words of texts for the former and 39 for the latter. The target ELA words, then, were somewhat shorter, more familiar, and less conceptually complex than the target science vocabulary, but they were less frequent.

An analysis of all unique words in an ELA program

A view of the vocabulary demands of narrative texts comes from an analysis that identified the entire pool of words from which the focus words at the beginning of this essay came. The analysis began with all 6,410 words in the five texts of the focus unit (Afflerbach et al., 2007). Of these words, 1,204 were unique or distinctive words.

The frequency of these words was established through an analytic scheme that draws on the Zeno et al. (1995) database (Author, 2005). The eight word zones within the WZP differ according to the frequency with which words in a zone are predicted to occur in one million words of text. A small group of words (930) make up zones 0-2. These words occur at least 100 or more times per one million words of text. Approximately 4,900 words are in zones 3 and 4 where words are predicted to appear with moderate frequency (from 10 to 99 times per one million words). The approximately 8,240 words that make up zone five are relatively rare (2 to 9 appearances per one million words). A group of approximately 5,650 words occur about once per one million words and make up zone six. The remaining words fall in

zone seven and occur less than once per one million (approximately 135,475 words in the Zeno et al. analysis of a 17.25-million-word corpus).

The distribution of the unique words in the five texts into the word zones appears in Table 2. It is the words of zones 5 and 6 that vocabulary instruction will likely emphasize since students are unlikely to have encountered these words previously in text. Words in zones 0-4 are ones which fourth-graders should know since these are words that are used frequently in their texts. Of the words chosen for instruction, approximately 63% were rare words. Most of these words appear once in the entire unit. Another 24% appeared 2-3 times. The remaining 10% appeared 4 times or more. Only 2% of this group appeared the requisite 10 times or more. The 33 words that introduced this essay represent approximately 5% of the rare/moderate words in the texts.

WordZones	Total Words (n=6420)	Unique Words (n=1240)		33 Target Vocabulary Words	
		proportion	repetitions (\underline{X})	proportion	Repetitions (X)
0-2	.81	.50	8.3	0	NA
3	.06	.15	2.1	.09	2.3
4	.09	.15	1.9	.27	1.4
5	.02	.13	2.0	.42	2.1
6	.01	.03	1.3	.15	1
7	.02	.04	2.6	.06	1

Table 2. WordZone Distribution of Entire, Unique, and Target Vocabulary: ELA Program

What can be concluded from this analysis is that there are numerous singleappearing words in narrative texts that appear infrequently in written language as a whole. It would be impossible for teachers to cover all of the words in lessons, even for a single text. Further, since the words can be exceedingly diverse in meaning, the instructional approach and task would be arduous. Finally, since almost all of these rare words appear infrequently in the text and are unlikely to reappear again in the texts that students are reading in other content areas, the longevity of students' learning—even of words that are taught intensively but appear a single time in a text—is uncertain.

A Description of the Vocabulary Megacluster Approach

Narratives have particular features, most notably a setting, problem, goal, action, outcome, resolution, and theme (Stein & Glenn, 1979; Whaley, 1981). The structure of narratives, as Bruner argued (1990), mirrors the way in which human beings describe their life experiences. Narratives are familiar structures and, typically, accessible to students. Within the instructional applications of story structure to the interpretation of texts, as Duke and Pearson (2002) showed, the structural aspects of text organization are emphasized rather than the concepts represented by these features of narrative. Students are taught to identify the particular components rather

than to identify evidence within the text. The elements of stories were taught as structures rather than as concepts represented by ideas or words.

In a conceptual, rather than structural, approach to narratives, students learn to expect that characters will be involved in actions to deal with problems or conflicts. Authors use a variety of words to label the characters, the actions, the events, and the particular contexts in which these events occur. It is likely impossible to predict the words that an author will use in a narrative. For example, it is rare that a writer of a mystery will use the words *suspense* or even *mystery*. The words used by an author to describe a particular trait may vary from sentence to sentence but there are likely to be words that describe the traits and emotions of characters. These words can be clustered into categories that share particular meanings. Students can be taught to anticipate that authors will use words to describe the various components of the narrative. It is in this anticipation—or a meta-linguistic awareness—that vocabulary development can occur.

The basis for a categorization scheme for the primary concepts of narratives and expository content can be found in a 1998 publication by Marzano and Marzano. They presented a categorization of 7,230 words taken from a number of sources common in elementary school texts (e.g., Carroll, Davies, & Richman, 1971; Dahl, 1979; Harris & Jacobson, 1972). Marzano and Marzano ordered these words into 61 superclusters that were semantically related.

One of the most prolific superclusters that they identified was occupations of people. All 364 words that they assigned to that supercluster had to do with occupations of people, but those words were further categorized into clusters of words even more closely aligned. The supercluster of occupations contained 30 clusters, each pertaining to a different type of job such as people in sports, entertainers, and royalty/statesmen. Words within clusters were further organized into miniclusters. For example, within the entertainers cluster, miniclusters include actress, clown, and entertainer. Each of the miniclusters has at least a handful of words, sometimes more. The minicluster of clown consists of: clown, barker, magician, comic, and juggler. In all, Marzano and Marzano identified 430 clusters within the 61 superclusters and, within the clusters, 1,500 miniclusters where words have the strongest semantic ties.

The Marzano and Marzano (1988) clusters were published just when attention in reading education moved to the "whole text." Extensions of and experimentation with the clusters have been limited. These clusters, however, provide a means for much-needed support for the selection and instruction of vocabulary that Nagy and Hiebert (2010) have described. In particular, the cluster approach may provide considerable guidance to publishers and curriculum developers regarding the many unique words in narrative texts that lack the thematic cohesiveness typically present in content-area texts and instruction.

American Reading Forum Yearbook – 2011 – Volume XXXI

For the cluster system to be useful to educators in selecting words for instruction, however, the system needs refinement. For one, the system needs to be able to integrate words from additional sources, such as the trade books that have become the basis for core reading programs. For such expansion, the superclusters themselves need to be defined and understood as conceptual sources of content. Another aspect of the superclusters that makes their use less than conceptual is the system's organization. Marzano and Marzano presented the superclusters in order of size (e.g., occupations first, types of motion next, and so on). The number of clusters—61—is also unwieldy.

To enable teachers and publishers to select the words to teach more efficiently, I have reconfigured the superclusters into 13 megaclusters, each of which represents a "big idea" about the content of texts. The development of the 13 megaclusters involved two steps: (a) eliminating and collapsing the superclusters and (b) identifying megaclusters from among the superclusters.

Eliminating and collapsing of superclusters

A first step was to eliminate a group of superclusters devoted to grammar: Pronouns, Contractions, and Auxiliary/helping verbs. The reason for this elimination is that the focus of the Vocabulary Megaclusters is on the conceptual content of words and the grammatical functions do not serve that purpose.

Subsequent changes to the remaining 58 superclusters are presented in Table 3. These changes involved collapsing several superclusters into related superclusters: (a) Health/disease was integrated into Human body, (b) an overall supercluster entitled Action was created from Helpful/destructive actions, Touching/grabbing actions, and Actions involving the legs, and (c) Noises/sounds and Facial expressions/actions were added to Communication, leaving 53 superclusters.

Identification of Vocabulary Megaclusters

The remaining 53 superclusters were examined with the aim of emphasizing particular components of narrative and expository texts. Many different perspectives could be brought to bear on the designations—just as is true with the original designations by Marzano and Marzano (1988). The final set of 13 megaclusters was derived from the primary components of narrative texts (Stein & Glenn, 1979; Whaley, 1981).

It should be noted that the integrity of the superclusters has been retained. Within the database, vocabulary can still be viewed in relation to superclusters, clusters, and miniclusters where the greatest similarity exists. For example, while Occupations, Types of people, and Types of groups form the megacluster of Characters, the data on the supercluster of Occupations continue to be distinguished from the superclusters of Types of people and Types of groups. Researchers and educators working with the database can continue to identify the words in the closest possible grouping.

Vocabulary	Superclusters (in Original Marzano &	Changes from Original Superclusters
Megacluster	Marzano, 1988)	
I. EMOTIONS &	Feelings/emotion; Attitudinals	
ATTITUDES		
II. COMMUNICATION	Communication; Mental actions;	(Communication subsumes Facial
	Senses/perceptions	expressions/actions & Noises/sounds)
III. TRAITS OF	Nonemotional traits; Physical traits of people	
CHARACTERS		
IV. SOCIAL	Ownership/possession;	
RELATIONSHIPS	Popularity/knownness; Life/	
	survival; Conformity/complexity	
V. CHARACTERS	Occupations; Types of people; Types of	
	groups	
VI. ACTION & MOTION	Action; Motion	(Action subsumes Touching/
	,	grabbing, Actions involving legs,
		Helpful/destructive actions)
VII. HUMAN BODY	Human body; Clothing	(Human body subsumes Health/disease)
VIII. FEATURES OF	Value/correctness; Similarity/	
EVENTS/THINGS/	dissimilarity; Cleanliness/	
PEOPLE	uncleanliness; Difficulty/danger; Causality	
IX. PLACES/EVENTS	Places where people live; Dwellings/	
	shelter; Rooms/furnishings; Events	
X. PHYSICAL	Size/quantity; Time; Location/	
ATTRIBUTES OF	direction; Shapes/dimensions;	
THINGS/EVENT/	Texture/durability; Color	
EXPERIENCE	Texture/durability, Color	
XI. NATURAL	Animals; Foods; Water/liquids; Land/	
ENVIRONMENT	terrain; Vegetation; Soil/metal/rock; Light;	
	Weather; Mathematics; Temperature/fire;	
	Chemicals; Electricity	
XII. MACHINES	Machines/engines/tools;	
	Transportation; Materials	
XIII. SOCIAL SYSTEMS	Literature/writing; Money/	
	finance; Sports/recreation;	
	Language; Entertainment/arts	

Table 3. Contents of Vocabulary Megaclusters and Adapted Superclusters

Expanding and validating the database

The database, initiated with the original words designated by superclusters, clusters, and miniclusters, has been extended to approximately 8,500 words. New words being added to the vocabulary corpus undergo a vetting process. First, the synonyms of a word are identified and a rater experienced in the semantic clustering procedures identifies a match to a particular minicluster, cluster, supercluster, and megacluster. Periodically, a second rater, also experienced in semantic clustering, independently categorizes the words that have been added to the database. When disagreements between raters arise, the nature of the disagreements and their resolution are recorded. After every 350 new additions to the database, a third

experienced rater examines 20% of the additions as well as a randomly selected set of words that were part of the original database to ensure the fidelity of categorizations.

To determine how well the Vocabulary Megaclusters accounted for the newly added vocabulary, words that had been identified as rare in Table 2 (i.e., the 149 that appeared in WordZones 5 and 6 in the ELA unit) were examined in relation to the Vocabulary Megaclusters database. The summary of this classification is given in Table 4. A Vocabulary Megacluster that is also common to informational texts— Nature—had the largest corpus of words. Since two of the five texts in the unit are magazine articles that have both narrative and informational elements, the appearance of words having to do with nature is understandable. As would be expected of narrative text, the Vocabulary Megaclusters of Communication and Action were also heavily represented.

MEGACLUSTER	EXAMPLES	NARRATIVE
Communication	summoned, shrieked	.11
Emotions & Attitudes	anticipation, expected	.04
Traits of Characters	daring, dignified	.02
Social Relationships	peculiar, free	.03
Characters (Occupations,	duke, magician	.06
People, Groups)		
Action & Motion	dangled, swatted	.15
Comparatives/Values	identical; useless	.04
Body & Health	muscles, vaccine	.03
Places/Dwellings	homeland; mansion	.04
Physical Attributes	massive	.10
Nature	precipitation, sedimentary	.26
Machines	pulley, vehicle	.07
Social Systems	sculptures, payroll	.05

Table 4. Distribution of Megaclusters Across Rare Words of an ELA Unit

Application of the Vocabulary Megaclusters

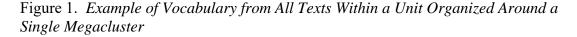
How might the information about Vocabulary Megaclusters be used by teachers? I offer two potential routes for a "conceptual" approach to narrative: (a) shared Vocabulary Megaclusters across a set of texts and (b) unique Vocabulary Megaclusters as a function of the author's use of language in a specific text.

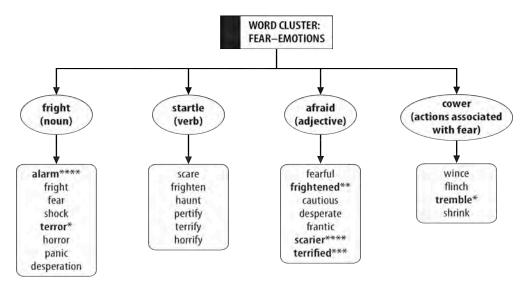
Shared Vocabulary Megaclusters

Vocabulary that is typically critical in a narrative has to do with the ways in which characters communicate and with the characters' emotions and attitudes.

Vocabulary associated with these critical aspects of narratives could be developed with particular clusterings of texts and also could be a focus of instruction in different grades. Emotions of fear, joy, and anger, for example, would be represented by larger and richer vocabularies through the grades, with the vocabulary of narratives read in earlier grades becoming the foundation for expanding and enriching the vocabulary related to a concept in later grades.

In the particular set of texts that formed the focus unit, the emotion of fear was present in four of the five texts. In *Adelina's Whales* (Sobol, 2003), Adelina's grandfather is frightened. In *The Stranger* (Van Allsburg, 1986), the stranger is filled with terror, and in *How Night Came From the Sea* (Gerson, 1994), the servants are terrified. In *Eyes of the Storm* (Kramer, 1997), Warren (the storm chaser) describes how the situation is getting scarier and scarier. The words used in the texts are the basis for a semantic map that appears in Figure 1. The number of synonyms and semantically related words for this concept is enormous. A recommendation that Nagy and Hiebert (2010) have made is for teachers to guide students' attention to a core set of words and then, gradually, to examine the semantic map. If too many words are introduced at once, students may have difficulty establishing the nuances of meanings.





* The Stranger (Van Allsburg, 1986)

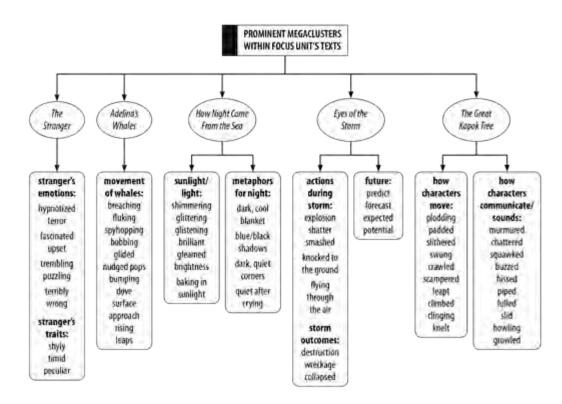
** Adelina's Whales (Sobol, 2003)

- *** How Night Came from the Sea (Gerson, 1994)
- **** Eyes of the Storm (Kramer, 1997)

Unique Vocabulary Megaclusters of individual texts

By examining the unique megaclusters represented in each of the five texts in this unit, I was able to identify possible emphases for the instruction of vocabulary in each text. The uniqueness of each of the texts is represented in the semantic map in Figure 2.

Figure 2. Example of Selection of Megaclusters Based on Individual Texts Within a Unit



In the two narratives—*How Night Came From the Sea* (Gerson, 1994) and *The Great Kapok Tree* (Cherry, 1990)—language is used richly and uniquely. *How Night Came From the Sea* has an array of adjectives that are used to describe the brightness of the light, which is new and jarring for the unnamed woman in the story. For the night—which represents the woman's previous experiences—the author uses numerous metaphors. A teacher could initiate an interesting conversation as to whether there are descriptions for darkness of the same variety as those for brightness, or whether metaphors are typically used to describe darkness and night.

The two magazine articles—Adelina's Whales and Eyes of the Storm—use different words from those in the narratives. But there are, in addition, significant differences in the ways that the authors employ language. For example, the vocabulary of Adelina's Whales is fairly straightforward, as might be expected in a magazine article, with one exception: the actions of the whales (e.g., *fluking, spyhopping, breaching*). The author's choice of these less common words allows for

American Reading Forum Yearbook – 2011 – Volume XXXI

a discussion of how compound words are created (such as *spyhopping*) and the nature of old Anglo-Saxon words (*fluke*, *breach*).

One could even imagine a set of texts chosen because they illustrate ways in which authors use language to express various contexts. London's (1906/2010) White Fang and Paulsen's (1987) Hatchet could be compared for their representations of adventure and danger. Erdich's (2002) The Birchbark Tree could be discussed with O'Dell's (1960) Island of the Blue Dolphins to understand how different authors might communicate despair, hope, and human ingenuity.

The current instructional approach of focusing on six to eight disparate words over a week does little to develop a strategic stance on the part of students. If students are to develop a deep understanding of vocabulary in literary texts, instruction needs to uncover the underlying uses of language in narratives. The Vocabulary Megaclusters provide a framework for teachers, publishers, and curriculum developers to select vocabulary and design instruction around critical concepts within narratives. By focusing on principles of language rather than only on the individual word, students gain the generative stance that is needed to engage in lifelong expansion of vocabulary.

References

Afflerbach, P., Blachowicz, C.L.Z., Boyd, C.D., Cheyney, W., Juel, C., Kame'enui, E.J., Leu, D.J., Paratore, J.R., Pearson, P.D., Sebasta, S.L., Simmons, D., Vaughn, S., Watts-Taffe, S., & Wixson, K.K. (2007). *Reading Street*. Glenview, IL: Scott Foresman.

Author (2005).

- Author & Other (2011). What differences in narrative and informational texts mean for the learning and instruction of vocabulary.
- Biemiller, A. (2008). Words worth teaching. Columbus, OH: SRA/McGraw-Hill.
- Bruner, J. (1990). Acts of meaning. Cambridge, MA: Harvard University Press.
- Carroll, J., Davies, P., & Richman, B. (1971). *The American heritage word frequency book.* Boston, MA: Houghton Mifflin.
- Cherry, L. (1990). *The Great Kapok Tree: A Tale of the Amazon Rain Forest*. New York, NY: Harcourt, Inc.
- Dahl, H. (1979). Word frequencies of spoken American English. Essex, CT: Verbatim.
- Dale, D., & O'Rourke, J. (1976). *The living word vocabulary*. Elgin, IL: Field Enterprises Educational Corporation.
- Duke, N.K., & & Pearson, P.D. (2002). Effective practice for developing reading comprehension. In A.E. Farstrup & S.J. Samuels (Eds.), What research has to say about reading instruction (3rd Ed., pp. 205-260). Newark, DE: International Reading Association.

Erdich, L. (2002). The Birchbark House. New York, NY: Hyperion Press.

- Gerson, M.J. 91994). *How night came from the sea*. New York, NY: Little Brown & Co.
- Harris, A., & Jacobson, M. (1972). Basic elementary reading vocabularies. New York, NY: Macmillan.Kramer, S. (1997). Eye of the storm. New York, NY: Penguin Young
 - Readers Group.
- Leech, G., Rayson, P., & Wilson, A. (2001). Word frequencies in written and spoken English based on The British National Corpus. London: Longman.
- London, J. (1906/2010). White Fang. New York, NY: Simon & Brown.
- Marzano, R. J. (2004). *Building background knowledge for academic achievement*. Alexandria, VA: Association for Supervision and Curriculum Development.
- Marzano, R. J., & Marzano, J. S. (1988). A cluster approach to elementary vocabulary instruction. Newark, DE: International Reading Association.
- Nagy, W.E., Hiebert, E.H., (2010). Toward a theory of word selection. In M.L. Kamil, P.D. Pearson, E.B. Moje, & P.P. Afflerbach (Eds.), *Handbook of Reading Research* (Vol. 4; pp. 388-404). New York, NY: Longman.
- Nagy, W.E., Anderson, R.C., & Herman, P.A. (1987). Learning word meanings from context during normal reading. *American Educational Research Journal*, 24, 237-270.
- O'Dell, S. (1960). Island of the blue dolphins. Boston, MA: Houghton Mifflin.
- Paulsen, G. (1987). *Hatchet*. New York, NY: Simon & Schuster Children's Publishing.
- Snow, C.E., Griffin, P., & Burns, M.S. (Eds.) (2005). Knowledge to support the teaching of reading: Preparing teachers for a changing world. San Francisco: Jossey-Bass.
- Sobol, R. (2003). Adelina's whales. New York, NY: Dutton Children's Books.
- Stein, N. L., & Glenn, C.G. (1979). An analysis of story comprehension in elementary school children. In R.O. Freedle (Ed.), Advances in discourse processes (Vol. 2, pp. 53-120). Norwood, NJ: Ablex.

Van Allsburg, C. (1986). *The stranger*. Boston, MA: Houghton Mifflin Books for Children.

Whaley, J.F. (1981). Readers' expectations for story structure. *Reading Research Quarterly*,

17 (1), 90-114.

Zeno, S. M., Ivens, S. H., Millard, R. T., & Duvvuri, R. (1995). *The educator's word frequency guide*. New York, NY: Touchstone Applied Science Associates.

Soboleski, P. (2011). "This *They* Believe": An examination of the texts pre-service teachers know and how they know them. *American Reading Forum Annual Yearbook* [Online], Vol. 31.

"This *They* Believe": An examination of the texts preservice teachers know and how they know them.

Penny Soboleski Bowling Green State University

Introduction

"There is no one 'perfect method' for teaching reading to all children. Teachers, policy makers, researchers, and teacher educators need to recognize that the answer is not in the method but *in the teacher*" [emphasis added] (Duffy & Hoffman, 1999, p. 10)

Teacher educators of reading find themselves in a quagmire as we attempt to prepare out pre-service teachers for classrooms in the 21st century. Many of our students come from a culture rich in digital media and increasingly poor in printed texts. The average student sports a cellular phone that is capable of texting words, photos, and videos, something that was virtually impossible the decade most of them were born. They read their textbooks digitally from iPads, iPods, or their personal laptop computers (thin enough to tuck in their backpacks). Conducting on-line literature searches from the university's on-line library while lounging in a dorm room replace trips to the library for research. No need to purchase the newspaper; it, too, can be read digitally at the readers' convenience. They have developed effective media and digital literacy skills. Yet, many of the classrooms they enter rely solely on printed texts. Similarly, fewer students entering teacher education consider themselves as enthusiastic readers (Brooks, 2007).

Two theoretical perspectives toward reading provide a multi-dimensional look at the complex process of reading as well as an understanding of the influences of factors beyond the text and the reader. Rosenblatt's (1978) transactional theory of reading hypothesized that reading is much more than the cognitive processes of the reader with print. Rather than a process, Rosenblatt saw reading as an event, an unrepeatable, infinitely unique appointment between the reader, the text, and the moment in time the two intersect. The reader's purpose for reading, either afferent or efferent, established the backdrop for the event, as did the environment in which the reader is reading, thereby creating a unique reading experience.

Similarly, Trabasso (1980) posited that the reader must engage in four levels of knowledge simultaneously to comprehend a text. These levels on the dimensions of knowledge the reader must engage during comprehension of the text to include the following four constructs: the knowledge of verbal concepts, text structure, social interactions, and human intentionality. The reader's socioemotional and cultural experiences as well as the purpose for which the reader is reading influences the reader's construction of meaning. Theoretically, the perspectives are quite similar and relevant when considering how pre-service teachers perceive reading.

Teacher educators in the 21st century face a new challenge in course development as they prepare to teach pre-service teachers how to teach reading at the intersection of digital and printed texts. Our classes are much more culturally and socially diverse than in the previous century, which means their prior knowledge of reading is most likely just as diverse. Moreover, their purposes for reading are just as diverse. The complexity of our students' preconceived notions about reading and the texts they read requires teacher educators to become familiar with what their students believe about reading and the texts they read.

The study aimed to answer the following questions: (a) Which texts do undergraduate and graduate students perceive to be meaningful in their acquisition of reading and literacy skills? (b) How do students know or relate to these texts? and (c) Which text features do these texts share, and how might these features contribute to a personal connection with what the student believes about reading and literacy?

Perspective/Theoretical Framework

Understanding how learners acquire new information has resulted in a number of cognitive learning theories. The schema theory (Bartlett, 1932) suggests that learners acquire and organize new information or experiences (schemata) by attaching and supplementing new knowledge to previously learned information (pre-existing schemata). If the learner possesses some prior knowledge or understanding of the material, the activation of the pre-existing schemata permits more rapid construction of new schemata during the learning process; the greater the quantity of pre-existing schemata, the more rapid the acquisition of new information and understanding of the text. Piaget (Piaget & Inhelder, 1969) developed the theory of constructivism upon the notion that the child, as an active and motivated learner, encodes or files new information by attaching it to previous knowledge or experiences (schemata). He suggested that providing students with a variety of experiences would support them in the assimilation or accommodation of the new information. Constructivist teachers of reading acknowledge the contributions of the reader's prior knowledge in the construction of meaning and posit "that meaning does not reside in the text, but in the reader" (Lipson, 1983, p. 449).

Teachers of reading have long understood the correlation between the reader's knowledge of the subject matter prior to reading and the reader's ability to comprehend the material (Alverman, Smith, & Readence, 1985; Rumelhart & Ortony, 1977; Spiro, 1980; Tierney & Cunningham, 1984). Several early studies indicated the strength of the reader's schemata was predictive of the reader's ability to respond to inferential questions (Omanson, Warren, & Trabasso, 1978; Pearson, Hansen, & Gordon, 1979).

Research in the skill-based areas of conceptual knowledge and text structure were some of the first constructs studied (Guthrie, 1973; Smith, 1965, 2002). However, little early research focuses on the reader's knowledge of social interactions and human intentionality until the emergence of Rosenblatt's (1978) transactional theory of reading and Rumelhart's (1985) interactive theory of reading. Rosenblatt posited that reading involved more than skills, the text, and the reader; reading was an experiential event—the fourth dimension, if you will. Likewise, Rumelhart acknowledged the multidimensional nature of reading. Comprehension of the text, in other words, involves the combined knowledge of the reader's conceptual understanding of the text and its structure, previous and current socioemotional and social experiences, and purpose for reading (efferent or afferent). Similarly, the more a reader reads, the deeper their understanding of the nature, process, and experiences.

This I Believe

Understanding the power and influence of prior knowledge prompted this study of how undergraduate and graduate pre-service teachers in core reading courses perceived reading, teaching and learning how to read, and the texts used to teach reading. Therefore, the students received this assignment on the first day of class. This assignment was modeled after the text *This I Believe* (Allison & Gediman, 2006; Murrow, 1952). "This I Believe" began as a radio show hosted by Edward R. Murrow on National Public Radio from 1951 to 1955 featuring the personal credos of a wide sampling of individuals. Responses from the program were later published in a collection by the same title (Murrow). In Murrow's foreword he recalls the indelible impression of the steadfastness of Britain in 1940 and the following years as the country stood alone during the early years of World War II. He was perplexed by the people's ability to "devise a system of regulating the relationship between the individual and the state which was superior to all others" (p. vii); the character and beliefs of individuals melded together under great pressure and opportunity resulting in a resolution of united confidence. It is

safe to assume each member of Britain's military and civilian sectors held different personal beliefs, yet collectively, they transcended their doubts and frailties in united purpose and identity.

American education is facing a situation very similar to those launched against Britain 70 years ago. Political forces are pressuring states to surrender to more restrictive federal legislation that continues to strip states and local districts of power and autonomy. Tightening measures of accountability and retribution loom over teachers struggling to teach state academic standards and test preparation. Unfortunately, our teachers are caught in the crossfire. They depend upon their professors, teachers, administrators, and parents to protect and defend them. Teacher educators realize this. We are responsible for preparing our preservice students for the political, academic, social, cultural, and interpersonal battles they will face in their classrooms, especially those who teach reading (International Reading Association, 2007).

The role of reading in society dates back several thousand years and several hundred years in American history (Smith, 2002). In the preface of her original work, Smith (1965) reminds readers that "reading was the most important subject in our early American schools, and it has continued to be the most important subject all through the years of our national growth" (p. xv). Pasacharopoulos (1981) writes that a country's greatest societal returns are its investment in its human capital, specifically in its educational system and primary years of schooling. The preparation of America's primary teachers is gravely important because it is during these early years children learn to read and write. Public education has long felt the responsibility of preparing educated and literate citizens; this sense of responsibility may have perpetuated the U.S. Department of Education's (1867) decision to use of reading assessments to measure performance and "to collect information on schools and teaching that would help the States establish effective school systems" (ED.gov, 2010, ¶ 4). Most recently, The International Reading Association (IRA, 2010) has collaborated with educators, professors, and classroom teachers to design a research-based set of professional standards for reading professionals, including the teacher educator. One of the primary charges assigned to teacher educators is to "be responsible for developing programs for preparing reading professionals, including the development of course work and field site experiences, and coordinating or leading such programs" (International Reading Association, 2010, p. 23). Therefore, this assignment was one way to gather some sense of my students' prior knowledge and perceptions of reading and the texts they associate with reading.

In addition to providing teachers with a strong foundation in research and theory, word-level instructional strategies, text-level comprehension strategies, reading and writing connections, instructional approaches and materials, and assessment (International Reading Association, 2007), many in the field acknowledge the influence of personal reading habits, preferences, and attitudes in providing effective reading instruction (Allington, 2002; Commeyras, Bisplinghoff, & Olson, 2003; Duffy & Hoffman, 1999). Expectations for providing effective reading instruction over the past decade have recognized the need to foster growth and development in related attitudes and beliefs of reading teachers. Early surveys of the reading practices of teachers revealed a wide variety of habits, preferences, and personal attitudes (Cogan, 1975; Williamson, 1991; Worden & Noland, 1984). Southgate, Arnold, and Johnson (1977) found that only three of the 127 teachers mentioned the importance of their personal enthusiasm for reading as a factor for motivating their students to read. Perhaps the teachers assumed their modeling was expected and commonplace or teachers do not believe they can pass along their reading enjoyment to their students. Williamson (1991) suggests that perhaps many teachers of reading lack an enthusiasm for reading, thereby preventing them from setting an example of passionate reading.

Research Design, Participants, and Instruments

This study used a qualitative methodology. Data was collected from a course assignment, "This I Believe About Reading and Literacy" in both the undergraduate and graduate courses *Phonics: Learning to Read, Emergent Literacy: Reading to Learn* and *Assessment and Diagnosis of Reading Difficulties* at a small private university in the Midwest. Coding of the data followed guidelines established by Bogdan and Biklen (2003). The researcher conducted purposive interviews several weeks after the submission of students' statements, however, this study addresses only the results of the belief statements.

Participants

The study used a convenient sample of eighty-seven graduate and undergraduate students (52 undergraduate, 35 licensure-seeking graduate students) in three core-reading courses completed the assignment. Candidates were seeking licensure in one or more of the following areas: early childhood, middle childhood, and intervention specialist. The demographic composition of the sample includes 13 males (14.9%), 2 African-American females (2%), 1 Hispanic female (1%), 3 Asian females (3%) and two participants were second language learners (L2) in English; their primary languages (L1) were German and Spanish.

Instrumentation and Data Collection Procedures

Criteria for the assignment are consistent with the criteria established by Allison and Gediman (2006). Students' responses were to be between 500-1000 words, and their belief statement concerning what they believed about reading was to be constructed using the following criteria (Allison & Gediman, 2006):

Frame your beliefs in positive terms. Refrain from dwelling on what you do not believe. Avoid restatement of doctrine. Focus on the personal, the "I" of the title, not the subtly sermonizing "We." While you may hold many beliefs, write mainly of one. Aim for truth without accusation, patriotism without political cant, and faith beyond religious dogma. (p. 3)

Instructions did not direct or guide students to include specific mention of texts in the belief statements. Each statement received two initial readings: one for familiarization of the content and a second for the purpose of grading mechanics. Copies of the original submissions were used to begin the third reading. During the third reading, coding categories were established using frequently mentioned phrases using the criteria suggested by Bogdan and Biklen (2003). Phrases/sentences/words with similar codings were sorted for overarching themes. Four primary categories included (a) mention of text(s), (b) text features, (c) readers' perceptions related to their cultural and social environments, and (d) readers' intentionality toward teaching, learning, or participating in reading. The second layer of coding identified repeated words or phrases in each category; related terms were combined if the terms were synonymous, e.g., "Reading is fun" and "Reading is enjoyable."

Findings

As expected, student responses were diverse; some sprinkled favorite children's literature throughout their essays, while others were unable to name a favorite. Some found books to be therapeutic or empowering, others found them to be torturous or frightening.

The first criterion measured was the students' mention of text (Research Question 1). Only 61 (70.1%) of the students mentioned texts in their belief statement. Almost half (30, 49.1%) of the respondants specifically mentioned children's literature as being very important in learning how to read. Nearly a quarter of those mentioning texts in the early acquisition of reading stressed the importance of providing a literacy-rich environment or early exposure to texts in the home. However, only one student defined a 'literacy-rich' environment; the definition provided was "a lot of different books for children to read".

A wide variety of genres were mentioned in the students' belief statements (see Table 1). The most commonly mentioned text was picture books (13.1%) with phonics/decodable readers and books-on-tape (4.9%) sharing the second and third most frequently mentioned genre. Seven specific books were mentioned in the belief statements; they were *Where the Wild Things Are* (Sendak, 1988), *Charlotte's Web* (White, 1952), *Thumbelina* (Anderson, 1835), *Mother Goose's tales*, and *Aesop's Fables*. Participants also mentioned enjoying the Harry Potter books (Rowling), Shakespeare's works, and the works of Charles Dickens. Sadly, 29.8% of the students (*n*=26) did not mention any type of text.

Genre	n	Percentage
Alphabet books	1	1.6
Bedtime stories	1	1.6
Books-on-tape	3	4.9
Classic literature and stories	2	3.3
Magazines	1	1.6
Newspapers	2	3.3
Nursery rhymes	1	1.6
Phonics (decodable) readers	3	4.9
Picture books	8	13.1
Student-selected books	1	1.6
Variety of books	2	3.3

Table 1. Texts and Genres Mentioned by Students

The second research question addressed how students know or relate to the texts they mentioned. The primary connections between the students and texts were early childhood and family. The most common responses began with "my parents". Many respondents wrote "I can remember my parent(s) or grandparents reading stories to me during the pre-school years", "My parent(s) read and reread my favorite books", "My grandparents read books I selected". Some commented how their "parents helped them with reading homework during elementary school." Two other prevalent comments were "Reading books [as a genre] were boring", and "Content books were boring". One only student commented on reading during their adolescent years, while two students specifically mentioned reading classic literature during their high school years.

Thirty-five (40.2%) of the participants explicitly addressed their purpose(s) for reading. Seven said that reading was fun and enjoyable. Twelve participants (13.7%) said they read primarily to acquire information or knowledge. Six students (6.8%) wrote that reading stimulated their creativity and allowed them to use their imagination, or "to make my mind work". Escapism and exploration and discovery were mentioned by three and five participants respectively as their purpose for reading.

The third research question explored common text features and the possible relationships the features may have to the participants perception of text. Text features mentioned in the statements and exhibited in the texts mentioned by the preservice teachers are presented in Table 2.

Genre	Rhyme	Illustrations/	Graphics	Chapters	Read	Inform
		Pictures			aloud	ation
Alphabet books	\checkmark				\checkmark	
Bedtime stories			\checkmark	\checkmark	\checkmark	
Books-on-tape	\checkmark			\checkmark	\checkmark	\checkmark
Classic literature	\checkmark			\checkmark	\checkmark	
Magazines			\checkmark			
Newspapers		\checkmark	\checkmark		\checkmark	
Nursery rhymes	\checkmark	\checkmark			\checkmark	
Phonics readers	\checkmark		\checkmark		\checkmark	
Picture books	\checkmark	\checkmark			\checkmark	
Self-selected	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	
Variety of books	\checkmark	\checkmark	\checkmark	\checkmark		

Table 2. Text Features of Identified Texts

The two most common text features were illustrations or pictures and the text was orally read to the participant. Rhyme was the third most common feature. The relationship between the texts, features of the texts, and the readers will be discussed in the next section.

Limitations

Several limitations affect the generalizability of the study's results. Primarily, the demographics of the sample are representative of the regional demographics, but not the demographics of most regions or school districts. 93% of the participants were Caucasian and 87% were female. Although specific socioeconomic data was not available for the participants, most likely come from middle income households.

Another hindrance to generalizability is the ambiguity of the belief statements in relationship to the study of texts. Future instructions for the assignment might directly address the place of texts in reading or solicit specific comment on the role of texts in the participants' beliefs on reading and literacy while maintaining the integrity of the model. A reading interest survey may have provided depth to the participants' responses and provided additional opportunities to identify patterns and relationships. Including an analysis of the interviews would have provided a nice triangulation of the findings and conclusions.

A major flaw in the design of the project was the omission of a team of readers and coders. Having several other content experts collaborate in the coding of the findings may have yielded very different findings and strengthened the validity of the study.

Implications

Texts that seem to be student favorites may provide some insight as to why they left lasting impressions or distastes for reading. Literacy research suggests that effective teachers of reading should be readers themselves (Atwell, 1998; Commeyras, Bisplinghoff, & Olson, 2003; Draper, Barksdale-Ladd, & Radencich, 2000; Gambrell, 1996; Mueller, 1973; Routman, 1991, 1996; Searls, 1985). Teachers who enjoy reading become "an explicit model" of reading (Gambrell, 1996) for their students. Applegate and Applegate (2004) coined this relationship as the *Peter Effect*.

The Peter Effect takes it name from the biblical account of Peter and the beggar. When the beggar seated at the base of the gate called Beautiful solicited alms (monetary donations) from Peter, the Apostle was unable to give him alms because he did not have any money. Similarly, teachers who do not possess an enthusiasm or passion for reading are unable to pass along an enthusiasm for reading to their students. If preservice teachers do not enjoy reading, do not engage in an active practice of leisure and professional reading, and do not think reading is important, they are only able to pass these perceptions on to their students.

It bears to reason that teachers who are not motivated, enthusiastic readers provide an explicit model as well, that of disengagement. It is this thought that teachers are 'explicit models' of reading that fueled this study of what preservice teachers believe about reading, texts, and how they know or relate to the texts. If preservice teachers' most cherish books read aloud to them as children and do not have a vibrant reading-rich life as adults, it is unlikely they will emerge from our classrooms as passionate readers. It is also unlikely they will foster an enthusiasm for reading in their own classrooms. The instructional implications of this deficiency cannot be overlooked in teacher education programs.

This study may also help reading professionals reevaluate the content of our courses as we begin to understand our students' prior knowledge and perceptions of texts, reading, and literacy. Teacher education programs may want to reflect on their reading environment. Probing questions such as "How do our courses and instructors model healthy, vibrant personal and professional reading models? How might our existing courses be modified to nurture times of self-selected reading and reflection? How might our faculty engage in professional or leisure reading book clubs? Which book might the college adopt as a common read? On a personal level, teacher educators may want to ponder the following questions: Am I an enthusiastic reader? Why? How can I reignite my passion for reading? How can I begin providing my students with an "explicit model" of reading in my courses? If my students have endearing associations with read alouds, how might I integrate reading aloud in my courses? How can I help them bridge the wonderful

memories of their youth to the construction of a classroom where students experience the wonders of reading?

Lastly, this paper is an extension of the *This I Believe* heuristic introduced during a problems court at the 2009 ARF conference. It demonstrates the value of discovering what our students believe about texts, reading, and literacy as we endeavor to equip pre-service professionals to become effective teachers of children in reading and literacy. The results have resulted in several modifications of the existing courses. Students are now given eight minutes of DEAR time (Drop Everything And Read) in the "Phonics" and "Emergent Literacy" courses. The only stipulation is the text must be self-selected, and the text may be either print or digital. The response has been very positive. In subsequent reflections numerous students have written that they "have fallen in love with reading again." One student is responsible for selecting a favorite read aloud book to share with classmates during each session. Students have enjoyed listening to 'old favorites' and collecting titles to add to their libraries.

In the forward of Murrow's publication, he writes that this book is "a compilation of experience and incident which may help you to recognize some of the signposts that have been meaningful to others" (p. xi). Like Murrow, it is my hope that in sharing some of the signposts (perceptions and misconceptions) of reading among these emerging elementary, middle childhood, and interventional specialist pre-service teachers might help us to identify the signposts of their understanding of reading and what they identify to be meaningful texts in the instruction of reading.

References

- Allington, R. L. (2002). *Big brother and the national reading curriculum: How ideology trumped evidence*. Portsmouth, NH: Heinemann.
- Allison, J. & Gediman, D. (2006S). *This I believe: The personal philosophies of remarkable men and women*. New York: Henry Holt and Company.
- Alverman, D. E., Smith, L. C., & Readence, J. E. (1985). Prior knowledge activation and the comprehension of compatible and incompatible text. *Reading Research Quarterly*, 20, 420-436.
- Applegate, A. J., & Applegate, M. D. (2004). The Peter effect: Reading habits and attitudes of preservice teachers. *The Reading Teacher*, 57, 554-563.
- Atwell, N. (1998). *In the middle: New understandings about writing, reading, and learning* (2nd ed.). Portsmouth, NH: Heinemann.
- Bartlett, F. C. (1932). *Remembering: A study in experimental and social psychology*. Cambridge, England: Cambridge University Press.
- Bogdan, R. C., & Knopp Bilken, S. (2003). *Qualitative research for education: An introduction to theories and methods* (4th ed.). Boston: Allyn and Bacon.
- Brooks, G. W. (2007). Teachers as readers and writers and as teachers of reading and writing. *The Journal of Educational Research*, 100(3), 177-191.
- Cogan, J. J. (1975). Elementary teachers as non-readers. Phi Delta Kappan, 56(7), 495-496.

- Commeyras, M., Bisplinghoff, B. S., & Olson, J. (Eds.) (2003). *Teachers as readers: Perspectives* on the importance of reading in teachers' classrooms and lives. Newark, DE: International Reading Association.
- Draper, M. C., Barksdale-Ladd, M. A., & Radencich, M. C. (2000). Reading and writing habits of preservice teachers. *Reading Horizons*, 40(3), 185-203.
- Duffy, G. G., & Hoffman, J. V. (1999). In pursuit of an illusion: The flawed search for a perfect method. *The Reading Teacher*, 53, 10-16.
- ED.gov (2010). The federal role in education. www2.ed.gov. Retrieved May 14, 2010, from http://www2.ed.gove/ about/overview/fed/role.html?src= ln Gambrell, L. B. (1996). Creating classroom cultures that foster reading motivation. *The Reading Teacher*, *50*, 14-25.
- Guthrie, J. T. (1973). Models of reading and reading disability. *Journal of Educational Psychology*, 65, 9-18.
- International Reading Association (2007). *Teaching reading well: A synthesis of the International Reading Association's research on teacher preparation for reading instruction*. Newark, NJ: International Reading Association.
- International Reading Association (2010). *Standards for reading professionals-Revised 2010*. Newark, NJ: International Reading Association.
- Mueller, D. L. (1973). Teacher attitudes toward reading. Journal of Reading, 17, 202-205.
- Murrow, E. R. (1952). This I believe: *The living philosophies of one hundred thoughtful men and women in all walks of life*. New York: Simon and Schuster.
- Omanson, R. C., Warren, W. H., & Trabasso, T. (1978). Goals, inferential comprehension, and recall of stories by children. *Discourse Processes*, 1, 337-354.
- Psacharopoulos, G. (1981). Returns to education: An updated international comparison. *Comparative Education*, 17(3), 321–341.
- Pearson, P. D., Hansen, J., & Gordon, C. (1979). The effect of background knowledge on young children's comprehension of explicit and implicit information. *Journal of Reading Behavior*, 11, 201-209.
- Piaget, J., & Inhelder, B. (1969). The psychology of the child. New York: Basic Books.
- Routman, R. (1991). Invitations: Changing as teachers and learners, K-12. Portsmouth, NH: Heinemann.
- Routman, R. (1996). Literacy at the crossroads: Crucial talk about reading, writing, and other teaching dilemmas. Portsmouth, NH: Heinemann.
- Rosenblatt, L. M. (1978). *The reader, the text, the poem: The transactional theory of the literary work.* Carbondale, IL: Southern Illinois University Press.
- Rumelhart, D. E. (1985). Toward an interactive model of reading. In H. Singer & R. B. Ruddell (Eds.), *Theoretical models and Processes of reading* (3rd ed., pp. 864-894). Newark, DE: International Reading Association.
- Rumelhart, D. E., & Ortony, A. (1977). The representation of knowledge in memory. In R. C. Anderson, R. J. Spiro, & W. E. Montague (Eds.), *Schooling and the acquisition of knowledge* (pp. 99-136). Hillsdale, NJ: Lawrence Erlbaum Associates.
- Searls, E. F. (1985). Do you, like these teachers, value reading? Reading Horizons, 25, 233-238.
- Smith, N. B. (1965). American reading instruction: Its development and its significance in gaining a perspective on current practices in reading. Newark, DE: International Reading Association.
- Smith, N. B. (2002). American reading instruction (Special Ed.). Newark, DE: International Reading Association.
- Southgate, V., Arnold, H., & Johnson, S. (1977). *Extending beginning reading*. Portsmouth, NH: Heinemann.
- Spiro, R. J. (1980). Constructive processes in prose comprehension. In R. J. Spiro, B. C. Bruce, &

W. F. Brewer (Eds.), *Theoretical issues in reading comprehension* (pp. 245-278). Hillsdale, NJ: Lawrence Erlbaum Associates.

Tierney, R. J., & Cunningham, J. W. (1984). Reasearch on teaching reading comprehension. In P. D. Pearson, R. Barr, M. L. Kamil, & P. Rosenthal (Eds.). *Handbook of reading research* (Vol. I, pp. 609-655). New York: Longman.

Williamson, J. (1991). Teachers as readers. Reading, 25, 30-38.

Worden, T. W., & Noland, R. (1984). An investigative study of teachers' reading preferences and related classroom practices. *Journal of Reading Education*, *10*, 31-38.

Wilson, Nance S. (2011). Celebrating the text we use: What we know and how we know it—A reaction. *American Reading Forum Annual Yearbook* [Online], Vol. 31.

Celebrating the Text We Use: What We Know and How We Know It—A Reaction

Nance S. Wilson Lourdes University

"...we want to engage in open-minded—and at least some of the time, open-ended—discussion of issues related to reading education" Wayne Otto ABE 1081 Toward Understanding Comprehension

Wayne Otto, ARF, 1981, Toward Understanding Comprehension

Comprehension is the heart of reading. Through the ability to comprehend we come to understand story and the issues of the world. Throughout time comprehension instruction has been affected by how we classify the origin of reading. In this paper, I will present historically prominent views of reading comprehension over time in an effort to see how we as reading educators have answered the questions: 1) What is comprehension? and 2) How do we facilitate comprehension?

The historical prospective overviewed in this paper "adds a critical dimension to the analysis of present-day events and issues" (Alexander & Fox, 2004). The four views are the bottom-up theory of reading, the top-down theory of reading, the interactive theory, and the transactional theory of reading. The bottom-up theory relates to views from behaviorist psychology. "Bottom-up theories view leaning to read as progressing from the parts of language (letters) to the whole (meaning)". The skills of decoding are considered the primary task of the reader while understanding will come with correct pronunciation of the oral code. The second theory, the top-down processing of reading, relates to the gestaltists view that ". . .the whole is greater than the sum of its parts".

This view of reading selects the stance that reading starts with the reader's knowledge, background experience and emotions that he brings to the text to help gain meaning. The third theory of reading comprehension is a combination of the first two. The interactive theory of reading accepts both positions for their merits and sees the interaction of the text and the reader. The transactional view assures that comprehension is a type of negotiation between the reading and the text. The four perspectives serve as an interesting window through which we examine where we have been and where we are going.

The Bottom-up Perspective

The bottom-up view of reading has occupied the thoughts of educators overtime. During the 1700's, Francis Bacon's view of words as having meanings that represent symbols, letters, sounds and words have predominated the view of reading comprehension (Bartine, 1989). From 1700 to 1825, reading focused on spelling, pronunciation and oral recitation (Venezky, 1989). This Memoriter model, saw reading as the holder of memory. The perspective was that the student memorized the text understanding would come (Robinson, 1990). The oral code of the text opened the doors to the comprehension of the text. "The ability to communicate the written text effectively through oral reading indicated the reader had mastered the meaning of the text (Robinson, 1990, p.16). Throughout 1783 to 1826 the theory that was predominated believed that meaning resided in the text.

Another theory that recognized meaning as coming from the text was the Step-by-Step model. This theory stated that understanding of the text would help to preserve the writer's thoughts (Robinson, 1990). In this view, reading comprehension is facilitated when mechanics and meaning are taught separately. The view is that if pronunciation is perfect, understanding will occur.

Comprehension as something that developed from text was supported by the reading materials such as McGuffey's Eclectic Fourth, which emphasized the skills of reading and recommended that students summarize or interpret text after reading to improve understanding (Venezky, 1987).

During the 1920's to 1930's bottom-up theorists conducted studies in comprehension that emphasized the skill and drill approach, such as finding the main idea. (Robinson 1990). Answering questions based on a text became the prominent form of testing reading comprehension because it was, and still is, considered to be convenient, economical and objective (Readance, 1983). At this time there was a switch from oral to silent reading that helped to foster the skill and drill multiple-choice format of comprehension testing. In 1912 Effie Butler Jones concluded that most people comprehension from this view continued to include the text

the as primary source for meaning. In 1931 Betty Trier Berry stated that a good reader needed to read for a general outlining of facts and for content but background knowledge and intelligence do not necessary play an important role in reading comprehension (Davis, 1968). During the 1930's most of the studies dealing with reading comprehension focused on skill and drill and a belief that meaning came from the text.

In 1929 I.A. Richard's "Interpretation in Teaching" said "For adequate comprehension. . .a reader must understand the literal sense meaning of the writer; recognize the writer's feeling or mood; comprehend the writer's time and his attitude toward the reader; recognizing a writer's intent of purpose and blend all four factors (Davis, 1968, p. 502). In short although comprehension was considered a key factor in reading it was believed that comprehension came purely from the text.

As recently as 1957 the bottom-up view of reading comprehension was prevalent. Lyman C. Hunt mentioned, ". . .that comprehension in reading involves two skills, word knowledge and paragraph comprehension" (Davis, 1968, p. 508).

In the 1960's the publication of kits and programmed materials aided the skill and drill concept of reading comprehension (Robinson, 1990). During the 1960's it was also believed that beginning readers did not need to worry about comprehension but needed to ". . . learn the code for translating print to speech" (Pearson Comprehension Revolution p. 8). Again the perspective is prevalent that comprehension is a reproduction of the text and that the reader plays only a small part, the part of receiver of text. "Comprehension was viewed as some degree of approximation of the text read. A mental model, if any, should look like the text itself" (Pearson, 1985, p.8).

The bottom-up view of reading, beginning with sounds and continuing on to meaning that stems directly from the text was a view held as early as the eighteenth century and as recently as today. The view that comprehension will develop from the ability to decode the text or retell the text assumes that comprehension is simply a recitation of the text.

The Top Down Model

Over time there have been many people who believed that reading came from the reader and not from the words or phonemes. Among the various views of readers' activities during the 1700's were conceptions of readers as important contributors to the meanings of the work read. There were even views that characterized the reader as the writer of the work read (Bartine, 1989).

As early as 1810, Albert Pickett stated in his Juvenile Expositor "It is certainly an object of more importance to excite in young and tender minds, a spirit of attention and inquiry, than to teach them to chant or prate over mere sounds, concerning which they can have not adequate idea of notion." (Venezky, 1987, p.257). This view of reading as beginning with the reader and moving to the text versus the text to the reader has played a small part in the views of comprehension over time.

The view of the reader being key to meaning was prominent in the Thought-Getting Model, 1883-1910, which noted that the child should, ". . .not learn the word in order to read the sentence, but read the sentence to read the word." (Robinson, 1990, p.49-50) The top-down model sees reading as the whole process.

The view that comprehension comes from the readers is at the heart of schema theory. This theory, largely supported by David E. Rummelhart, values the importance of prior knowledge in reading. Readers fit the information from the text they are reading into their schemata, or prior knowledge framework (Spiro, 1990). In 1984 in "The Role of the Reader's Schema in Comprehension" R.C. Anderson said. "Comprehension is a matter of activating or constructing a schema that provides a coherent explanation of objects and events mentioned in a discourse" (p.375). In other words, the schema theory states that the reader organizes information in the text based on their prior knowledge to gain an understanding of the text.

The top-down theory of reading believes that the way in which a reader approaches a text can change the interpretation of the text. "Knowledge provides part of the context within which reading is interpreted. The context is the filter through which one perceives the text" (Kintsch, 1994, p. 953). The expectations of the material, the previous knowledge, emotions and intentions of the reader affect the understanding the reader attains. Schank is quoted by Kintsch as saying, "We would claim that in natural language understanding a simple rule is followed. Analysis proceeds in a top-down predictive manner. Understanding is expectation based. It is only when the expectations are useless or wrong that bottom-up processing begins." (1994, p.952) The process of reading comprehension involves the reader forming a hypothesis to develop the meaning from the text. "Readers, even beginning readers, are active theory builders and hypothesis testers" (Ruddel, 1994, p. 997).

The top-down model places an "emphasis on the importance of what the reader brings to the reading event" (Reutzel, 1992, p. 36). Reading is generated from the reader about the text, creating a text that is dynamic.

Interactive Model of Reading

"Creating meaning with a literary text involves connecting life and text. And the act of creating meaning while reading a story or poem is at once highly individual and intensely social" (Cullinan, 1994, p. 43). This third theory of reading comprehension as an interaction between the reader and the text, has been the most prevalent theory over time.

From 1711-1712 many English Grammars acknowledged the importance of a move to sentences and phrases for meaning. (Bartine, 1989) The mechanical aspects of reading were still emphasized but the ability of the reader to comprehend the entire text was considered more important. In 1839 Horace Mann described two distinct levels of reading, mechanical and meaning, both of which must operate together (Venezky,1987). From 1826 to 1882 the Interlocking Model of reading stressed the central role of meaning while considering the mechanical aspects of reading. Intellectual reading was seen as the connector between mechanical and rhetorical reading. The idea was that reading comprehension was facilitated when mechanics and meaning were taught at the same time (Robinson, 2000). There was an interaction between the various reading skills to help gain meaning from the text.

Reading Maturity Tests given in 1936 by Feder were an attempt to measure a student's depth and integration of material into his thoughts (Gray, 1937). Throughout time many such as Gates acknowledged this integration of the top-down and bottom-up processes of reading comprehension in 1949. Gates stated that reading was neither simply a mechanical skill nor merely a thought-getting process (Farr & Carey, 1986).

Comprehension from this perspective was seen as an integration of the various skills and components involved in the reading process. Comprehension consists of an interaction between the reader and the characteristics of text. The interaction shifts along the continuum from reader-based to text-based processing, partly because pre-existing knowledge structures assimilate information contained in the text. When the text is unfamiliar, processing becomes more text-based, which is less efficient, partly because the reader has to create knowledge structures for assimilating information, which readers can do through the use of. . . metacognitive process" (Ruddell, Ruddell, & Singer, 1994, p. 520).

The concept of metacognition, or thinking while reading to help the reader use the text and his knowledge to gain understanding from reading, is central to the interactive view of comprehension. Metacognition proposes that as readers read he is continually refining and restructuring their understanding as part of the process of integrating the text with the reader for comprehension (Swartz, 1987, p.3). Interaction implies that two things are working together to meet a goal.

Transactional Model of Reading

The transactional view of reading comprehension puts context center stage (Rosenblatt, 1994). "Transactional theories describe reading as a relationship in which each element or participant in a literary event influenced and is influenced by others" (Reutzel, 1992, p. 40) In this theory, like the interactive, the text influences the reader and the reader influences the text. "The major difference between the transactional and interactive theory is that the transactional theory includes the situation context and purposes for reading as well as the reader and the text and views them as whole and individual" (Reutzel, 1992, p. 40).

John Dewey and Arthur F. Bently helped develop the theoretical framework for the transactional theory. They used the term "transaction" to imply "unfractured observation" of the whole situation (Rosenblatt, 1994 p. 1058). Dewey did tests that measured that obtaining facts did not adequately measure understanding (Davis, 1968, p.503). He looked at reading as a whole process in which the context of the process greatly affected the comprehension achieved by the reader.

Rosenblatt's theory demonstrated that what the reader brought to the text influenced the meaning he took from it. In 1938 she stated "There is no such thing as a generic reader or a generic literary work. . . . The reading of any work of literature is, of necessity, an individual and unique occurrence involving the mind and emotions of a particular reader" (Rosenblatt, 1978 p. xii). Rosenblatt believed that reading was a fluent activity that depended on various factors working simultaneously. One of the factors affecting the transactional theory of reading is the belief in two ways of reading, aesthetic and efferent. Efferent reading is reading to acquire information, such as content area reading. Aesthetic reading is reading with attention to what one is experiencing, feeling and thinking during reading (Rosenblatt, 1991 p. 444). This view carries the assumption that each reader is an individual in their knowledge gained and interpretation of a text. "Every reading act is an event, or a transaction involving a particular reader and a particular pattern of signs, a text, and occurring at a particular time in a particular context" (Rosenblatt, 1994, p. 1063)

The RAND Report: Reading for Understanding Toward an R&D Program in Reading Comprehension (Snow, 2001). Describes the transactional perspective as the interrelationship that occurs "within the larger sociocultural context" (p. xiiii) between the reader, the text, the activity, and the context. The reader brings skills and experiences, the text brings the code, the activity involves the purpose, and the context involves the classroom community and the broader community from which the reader comes to comprehend a text. This transaction expands beyond the reading and the text to include the activity and the context.

Looking towards the 21st century

As we move towards a future where the tools of reading have moved beyond the book to the computer and other e-reading devices, the text becomes interactive calling upon new perspectives regarding comprehension. These digital literacies require that we must approach reading comprehension in a new manner (Schmar-Dobler, 2003). Digital texts are often non-linear leading the reader to a different path than that intended by the author (Coiro, 2003). Thus the text takes a different role than in static texts where the reader cannot make his own text with the push of a finger or click of a mouse. In this new world of digital text, the perspective on which we answer the questions 1) What is comprehension? and 2) How do we facilitate comprehension? changes.

I challenge the members of the American Reading Forum to engage in new conversations regarding comprehension and what it entails in the 21st century.

Works Cited

- Alexander, P.A. & Fox, E. (2004). A historical prespective on reading research and practice. In R. B. Ruddell & N.J. Unrau (eds.) *Theoretical Models and Processes of Reading*. Newark, DE: International Reading Association.
- Bartine, D. (1989). *Early English reading theory: Origins of current debates*. Columbia, S.C.: University of South Carolina Press.
- Coiro, J. (2003). Reading comprehension on the Internet: Expanding our understanding of reading comprehension to encompass new literacies. *Reading Teacher*, 56 (5), 458-464.
- Davis, F. B. (1968). Research in comprehension in reading. *Reading Research Quarterly*, 3, 4, 499-545.
- Farr, R. & Carey, R.F. (1986) *Reading: What can be measured?* Newark, DE: International Reading Association.
- Gray, W.S. (1937). Summary of reading investigations: July 1, 1935 to June 30, 1936). *The Journal of Educational Research*, 30, 8, 553-576.
- Otto, W. (1981). *Toward understanding comprehension*. Invited Address, First General Session, American Reading Forum.
- Rosenblatt, L.M. (1978). *The reader, the text, the poem: The transactional theory of the literary work.* Carbondale, IL: Southern Illinois University Press.
- Robinson, R.D. (2000). *Historical Sources in U.S. Reading Educatin* 1900-1970, Vol. 1. Newark, DE: International Reading Association.
- Rosenblatt, L. M. (1991). Literary theory. In J. Flood, J. M. Jensen, D. Lapp, & J. R. Squire (Eds.), *Handbook of research on teaching the English language arts* (pp. 57-62). New York: MacMillan.
- Rosenblatt, L. (1994). The transactional theory of reading and writing. In
 R. Ruddell, M. Rapp Ruddell, & H. Singer (Eds.), *Theoretical models and processes of reading: 4th Edition* (pp. 1057-1092).
 Newark, Delaware: International Reading Association.

- Ruddell, R.B., Ruddell, M.R., & Singer, H. (1994). *Theoretical models and processes of reading* (4th ed.). Newark, DE: International Reading Association.
- Reutzel, D. R., & Cooter, R. B. (1992). *Teaching Children to Read: From Basals to Books*. Columbus, OH: Merrill/Prentice- Hall Publishing Company.
- Schmar-Dobler, E. (2003). Reading on the Internet: The link between literacy and technology. *Journal of Adolescent & Literacy*, 47 (1), 80-85.
- Snow CE. (2001). *Reading for Understanding Toward an R&D Program in Reading Comprehension*. Santa Monica, CA: RAND Education and the Science and Technology Policy Institute.
- Swartz, R.J. (1987). *Reading and Thinking: A new framework for comprehension*. Boston: Massachusetts Department of Education.
- Venezky, R.L. (1987). A history of American reading textbook. *Elementary School Journal*, 87, 248-265.

Wilson, Nance S. (2011). Using teacher observation to guide improvements. *American Reading Forum Annual Yearbook* [Online], Vol. 31.

Using teacher observation to guide improvements

Nance S. Wilson Lourdes University

Introduction

Take a look at successful athletes, companies, and schools and you will find a commonality that may surprise you. They have all had coaches. Although, in business they are often called consultants, they serve the same role as a coach, a person who is hired to give advice and support in order to help an individual or group improve.

Typically, teachers and schools look to improve student achievement through activities such as professional development and specific program implementation. These opportunities may come from graduate course work, professional conferences, or consultant led teacher-institute days. These conventional forms of professional development are ineffective as they are often led by outside experts who tell teachers what to do; but are not part of the school in which the teacher is working. An alternative to the outside expert is staff development provided by a site-based instructional coach (Gamse, Jacob, Horst, Boulay, & Unlu, 2008; Guskey, 2002). Coaches engage teachers in job-embedded conversations to improve research-based instructional practices (Knight, 2009).

In the past decade, the instructional coaching model has become better defined (Sailors & Shanklin, 2010). The rise of coaching as professional development is focused on involving participants in jobembedded on-going professional development that is interactive, collaborate, and reflective (Duffy, 2005; Joyce & Showers, 2002; Whitcomb, Borko, & Liston, 2009). Furthermore, the use of an instructional coach who is embedded in classroom practice and focused on research-based approaches is more effective in improving student achievement (Russo, 2004). There are many kinds of instructional coaches but the literacy coach (LC) serves schools' needs when they are focused on improving students' literacy. The literacy coach, like other instructional coaches, is embedded in the school and thus is able to have a powerful impact upon teaching and student achievement. Effective coaching calls for the coach to be in the classroom with teachers; coaching through problem-solving, planning lessons, providing feedback, and facilitating student learning on-site. Research indicates that this model of instructional coaching improves the quality of instructional practice and student learning (Vanderburg & Stephens, 2010; Wei, Darling-Hammond, Andree, Richardson, & Orphanos, 2009). The coach must use a combination of behaviors that shift between responsiveness to teachers' needs and directive to achieve coaching goals (Ippolito, 2010).

The purpose of this paper is to present a study that focuses on the interactions between a coach and teacher that led to changes in the teacher's instructional practices. The study took place at a private school on the southeastern coast of the United States. The overall goal of the study was to produce a detailed case study of the interactions between a coach and one of the teachers. Detailed case studies help to tap into the coach teacher interactions that lead to changes in instructional practice.

This study used case study methodology. "A case study is an empirical inquiry that investigates a contemporary phenomenon within its real-life context, especially when the boundaries between phenomenon and context are not clearly evident" (Yin, 2003, p. 13). The use of case study methods of inquiry are particularly appropriate for studies considering teachers and teacher knowledge because they help researchers develop a better understanding of the teacher and her decisions (Wilson & Gudmundsdottir, 1987). This method allows for an in-depth analysis of the details of the role of coach as well as the interaction between the coach and the teacher.

Data was collected through the use of field notes of meetings and classroom observations. The data was analyzed using a recursive approach to determine first a preliminary set of themes based on instructional techniques then adding additional themes to identify changes in teaching techniques over time. These changes were then analyzed against the notes to identify any connections that might exist. The findings presented are derived from this examination and are illustrative of the power of coaching.

Context

The study took place at a medium sized Pre-K to twelfth grade private school in the southeastern United States. The school is eleven years old with a high socio-economic-student population, yet as measured on the state standardized assessment, there is a wide variability in student achievement. The work reported in this study is the result of two years of the coach's work with the teacher.

The Literacy Coach (LC) is a university educator who has been affiliated with the school over a period of two years. The Literacy Coach was under contract with the school to provide professional development to teachers as determined through an analysis of school needs. The initial work of the coach involved getting to know the teachers, school, curriculum, and student achievement. Her responsibilities included planning and conducting professional development on literacy topics, and supporting teachers' application of the learning to their teaching.

The coach worked with all of the teachers at the school. This paper uses a case study of Carol, a fifth grade teacher, to highlight how building rapport plus observation, debriefing, and support led to instructional changes. The focus was on an initiative to improve students' reading comprehension as measured by the CTP-4 (Educational Records Bureau/Comprehensive Testing Program 4) standardized test of student progress.

Building Rapport

In order to build rapport the coach spent time with teachers through a variety of informal interactions to build an understanding of the school's culture and professional development wants and needs. The LC joined teachers in their planning meetings, hallway conversations, and lunch duties. She talked with them about their teaching, students, and families. These interactions included a series of informal meetings for the LC and Carol to get to know each other. Through the informal conversations, the LC hoped to learn about the culture of the school as well as the teaching practices currently employed.

Carol (pseudonym), a fifth grade teacher, was approached by the LC because she had over twenty-five years of teaching experience and had been at the school since it's inception. Carol invited the coach to visit her classroom to "help an old dog learn new tricks."

Together, Carol and the LC examined student sub-scores on reading comprehension for the CTP-4 (Educational Records Bureau/Comprehensive Testing Program 4). They examined these for strengths and weaknesses in students' knowledge. For instance, main idea was identified as a weakness, as the scores were lower on this sub-test than on others for Carol's students. She reviewed the expectations for this area, which included: "use explicit information to identify the main idea or primary purpose of a text or part of a text; and understand connections between and among explicit pieces of information from a passage" (Educational Records Bureau/Comprehensive Testing Program 4). Then Carol and the LC discussed instructional techniques for main idea. Carol explained, "that she had her students go back into the text to support their answers as a part of regular classroom practice." This discussion continued focused on examining other sub-scores and areas for improvement.

The LC facilitated another session with Carol, the goal of which was to address the instructional and reading strategies that would assist her in guiding students to meet expectations. To facilitate this discussion the coach modeled a description of a reading strategy along with a teacher's implementation plan for instructing the students in the strategy (see Table 1).

Expectation	Strategy	Source	Implementation Plan
use implicit information	Readers are able to think inferentially	www.dcsf .gov.uk/r	Model the different types of inferences and the mental steps that teachers do to enact the different
information from a passage to make inferences about the motives or behaviors of characters	 think inferentially when they connect their background knowledge of information, ideas, and experiences with text. <i>Teach the different kinds of inferences</i> Coherence inferences Elaborative inferences. Global inferences. On-line inferences Off-line inferences 	.gov.uk/r esearch/ data/uplo adfiles/D CSF- RR031.p df	inferences. Give students copies of the different kinds of inferences and ask them to be aware of the types of inferences they make and how they made them. The research evidence reviewed suggested that, in order to be good at inferencing, pupils need to: 1. be an active reader who wants to make sense of the text 2. monitor comprehension and repair misunderstandings 3. have a rich vocabulary 4. have a competent working memory Inferencing skills are also facilitated by: 1. having a wide background knowledge 2. sharing the same cultural background as that assumed by the text. Some of these factors are more pertinent to certain types of inference than others. For example, having a wide background knowledge does not influence the ability to draw coherence inferences to the same degree as it does elaborative or global inferences. Although the characteristics of good inferencers have been identified, there is limited research evidence to suggest how teachers could
			best improve the inferencing abilities of their pupils.

Table 1. Modeling the link between expectation, strategy, and implementation

After the presentation of the types of inferences and modeling of each by the LC, Carol talked about using a graphic organizer such as a Venn Diagram to compare and contrast elements from two texts. Carol also addressed the expectation of using "explicit information to identify the main idea or primary purpose of a text or part of a text" (Educational Records Bureau Comprehensive Testing Program 4) determined that she would use the "coming-to-consensus" process (Beers & Howell, 2003) across a variety of texts to model, guide, and support students in identifying the details that support main idea.

Observation, Debriefing and Continued Support

Following the focused discussions on student data and instructional needs the coach and Carol moved their discussions to the classroom. These discussions continued to focus on reading comprehension instruction with an emphasis on the instructional strategies employed. There were a total of six observation and debriefing sessions with Carol. Each observation lasted between 35 and 60 minutes of the integrated Language Arts/Social Studies block and the debriefing sessions lasted between 10 minutes and 45 minutes. The lessons observed all focused on a reading strategy, thus discussions focused on the instructional strategies such as modeling and teaching questioning.

For each of the observations, an observation tool was utilized. The tool specifically addressed instructional strategies that have been demonstrated as effective for improving comprehension (Wilson, 2009). The observations were recorded using a template created in File Maker Pro designed to capture teacher/student actions during literature instruction. The template combined the use of check boxes with a place for formal field notes of instruction.

The first section of the observation tool focused on instructional behaviors. The instructional behaviors highlighted teaching techniques that have shown success in the teaching of reading comprehension. The areas of instructional behaviors included modeling and questioning of students.

Modeling thinking processes is an instructional technique that is key to making the invisible task of reading comprehension visible and thus improving students' comprehension (Roehler & Duffy, 1991; Tovani, 2004; Wilheim, 2001). When teachers model for students they make the mental processes that we use to solve problems visible. The observation tool includes an evaluation of modeling by noting key aspects of the modeling process (see Figure 1). The LC marked the instructional behaviors observed during Carol's instruction.

Figure 1. Instructional Behavior: Modeling

- Modeling comprehension process
- Describing learning strategies
- Modeling when and why to use a strategy
- Teacher sharing thinking
- Teacher sharing how to solve a problem
- Teacher demonstrating how to do a procedure
- Other.....

The other areas of the observation tool looked at the instructional interactions teachers had with students. Within the goal of improving students' reading comprehension the tool looked at the types of questions asked, the way in which the questions were asked, the opportunities provided for students to reflect and discuss strategy implementation (see Figure 2). The first section, Initiate Respond Feedback, focuses on the traditional evaluation pattern of classrooms where the teacher calls on a student, the student responds, and the teacher comments (Cazden 1998). This model is ineffective (Van Bramer, 2004) thus it was hoped that more of an interactive model of questioning would be used. This model is focused on building understanding through conversation rather than judgment of knowledge (Van Bramer, 2004). In this model the teacher poses a question gives students time for reflection and allows discussion of responses between students as conclusions are drawn as a community.

Figure 2: Instructor behaviors: Questioning

- Initiate Respond Feedback
 - Lecture
 - Question asked/evaluated
 - Prior knowledge asked/evaluated
- Interactive Questioning
 - Question asked
 - Scaffolding provided by the teacher
 - Listening to & watching students
 - Providing students time for reflection
 - Probing students for more detailed response
 - Asking students to support response

Following each observation, Carol and the LC met for 30 minutes discussing the instructional behaviors used throughout the lesson. These debriefing sessions were focused on what was observed and recorded using both the observation tool and traditional field notes. The results of the debriefing sessions appear powerful when examining Carol's initial instructional behaviors and those following the observation/debriefing cycle.

Focus 1: Modeling thinking vs. Modeling Procedures

When the professional development sessions began Carol was observed demonstrating procedures to her students rather than strategies. For instance,

T: Let's talk about how to complete this inference activity. First look at the sentence "Some Native Americans build homes of wood where they lived year round." Then infer what this means about other Native Americans; it means others had homes made of resources other than wood and move around (October 2009).

This observation demonstrated a modeling of the procedure needed to infer but not the thinking processes that lead to the development of the inference. The debriefing session following this observation asked Carol how she felt the lesson inferencing went. Carol responded that it was still early in the year and she felt that as a first lesson the topic it went okay. The coach then asked Carol what she does when making an inference and Carol discussed using the text and background knowledge to draw a conclusion. The coach then showed Carol the six items in the observation tool on modeling (see figure 1) and they discussed how each looks in the classroom and helps students to learn strategies. This discussion continued informally throughout the next few weeks culminating in an inference activity of quite a different nature.

T: "What does it mean to infer?" Who should we visit if we don't know what it means -- we think it means something like to inform or gain knowledge. "Infer to draw a conclusion after considering all the facts" for example... Let's use A. He had a runny nose yesterday and now he is not in school today what can I infer about A. He is home sick. Notice how I used what I knew about A with what I know about stuffy noses to infer that he is sick. Now moving on to our lesson on World War II. First let's review our prior knowledge; yesterday what was one of the things that we learned about women. You can look in your book on page 342.

S: "It says millions joined the work force"

T: Okay, so if we have all this information what do you think we can infer about women during World War II. What can we infer about why millions of woman joined the work force?

S: The men were off fighting so the women had to work.

T: Is there anything we can infer about the types of jobs women had. Since, I know the men were off fighting and I see a picture of a woman holding a blowtorch and the book is making a big deal about woman working. I can infer that women worked jobs previously held by men".

Notice how in the second inference lesson the teacher described inference and shared her thinking during inferencing. This change was significant because it reflects a move toward research based instructional strategy. The two examples showed a change in classroom practice that might not have occurred had Carol not been open about the coaching and willing to participate in more than observation; but also in debriefing. In addition to the formal debriefing, Carol was known to stop the coach and informally share classroom stories and ask for feedback. Although not formally documented, these conversations seem significant in light of the change in student achievement.

Focus 2: Teacher questioning to build student independence

The type of talk in the classroom is a factor in student learning. The Initiate Response Feedback (IRF) model where the teacher asks a question and a student responds then the teacher provides feedback and then moves on to the next question has been demonstrated as ineffective (Van Bramer, 2004). When the professional development initiative began Carol was observed as asking students to orally respond and listen.

T: In your group, use your text to come up with three adjectives that describe Satchel Piage (about 3 minutes pass)....Think about what in the story tells you he is confident? What did he do that shows he is confident?" (October 2009)

In this example the teacher assigned the students a task, gave them time to do it; but then interrupts with the answer she was looking for, that the character was "confident." After the comments on what he did to show he was confident, the teacher asked the students a new question about the text, ignoring the remainder of adjectives the students may have come up with.

Following this lesson, the debriefing session focused on how Carol thought the lesson went and what she thought could be worked on. She mentioned that students were not as involved in the discussions as she had hoped. This initiated a discussion on how questioning behavior that coaches is different from IRF. The changes in the teacher's discussion practice was confirmed in the next observation:

T: "Let's look at this book and you will notice that you have a lot of the same vocabulary we have been discussing. Let's read this page and then think about what this paragraph tells us he is doing? (waits 1 minute)

S: He is selling things on the street.

T: So what vocab. word can we use? (waits 30 seconds before calling on student)

S: Peddler

T: Why? (waits 10 seconds before calling on a student)

S: Because he is 10 years old and selling things on the street and traveling to sell the things. (November 2009)

In this exchange, we may notice how the teacher provides wait time for the students to answer questions, gives them support in making connections, and scaffolds their response versus simply evaluating them or supplying the answers herself.

A month later, Carol further demonstrated her move away from IRF to more coaching behavior in a discussion about minorities during World War II.

T: "Prior to World War II how did the people of the United States feel about minorities?" Kids stare blankly at teacher -- she gives them ideas about slavery. "So, Prior to World War II how did the people of the United States feel about minorities?"

S: They didn't like them.

S: They were prejudiced. They thought blacks should be slaves.

In this final example the IRF classroom pattern has evolved productively from Teacher-Teacher, where Carol answered her own questions to Teacher-Student-Teacher-Student or the classic IRF pattern, and finally, to a Teacher-Student-Student pattern more characteristic of true discussion where students may respond to each other as well as to the teacher. This authentic change in classroom instructional strategies resulted from the productive interactions of the teacher and the LC.

Reflections

Throughout the work between the Literacy Coach and Carol, dialogue was center stage. Together they discussed specific reading strategies and instructional techniques to improve instruction on reading comprehension. Through these interactions we learned that the focused discussions on classroom teaching does have an effect on instruction. Thus illustrating the effectiveness of a coach on a teacher.

References

- Beers, S. and L. Howell. 2003. *Reading strategies for the content areas: AN ASCD action tool.* Alexandria, VA: Association for Supervision and Curriculum Development.
- Cazden, C. B. (1998). Classroom discourse. Portsmouth, NH: Heinemann.
- Duffy, G. (2005). Metacognition and the development of reading teachers. In C. Block, S. Israel, K. Kinnucan-Welsch & K. Bauserman (Eds.) (pp. 299-314). *Metacognition and literacy learning*. Mahwah, NJ: Erlbaum.
- Educational Records Bureau/Comprehensive Testing Program 4. (2010). CTP 4 Content Standards Manual. New York: Educational Records Bureau.
- Gamse, B., R. Jacob, R., M. Horst, B. Boulay, and F. Unlu (2008). Reading First Impact Study Final Report (NCEE 2009-4038). Washington, DC: National Center for Education Evaluation and Regional Assistance, Institute of Education Sciences, U.S. Department of Education.
- Guskey, T. (2002). Professional development and teacher change. *Teachers and Teaching*, 8, 3, 381-391.
- Ippolito, J. (2010). Three ways that literacy coaches balance responsive and directive relationships with teachers. *The Elementary School Journal*, 111(1), 164-190.
- Joyce, B. and Showers, B. (2002). Student achievement through staff development (3rd ed.). Alexandria, VA: Association for Supervision and Curriculum Development.
- Roehler, L. & Duffy, G. (1991). Teachers' instructional actions. In R. Barr, M.L. Kamil, P.B. Mosenthal, & P.D. Pearson (Eds.), *Handbook of reading research* (Vol. 2, pp.861–883). White Plains, NY: Longman.
- Russo, A. (2004). School-based coaching: A revolution in professional development-or just the latest fad? *Harvard Education Letter: Research online*, 2004.
- Sailors, M. & Shanklin, N, (Eds.). (2010). Introduction: Growing Evidence to Support Coaching in Literacy and Mathematics. *Coaching, teaching, and learning [Special issue]. The Elementary School Journal*, 111, 1, p. 1-6.
- Tovani, C. (2004). Do I really have to teach reading? Content comprehension grades 6–12. Portland, ME: Stenhouse.
- Van Bramer, J. (2004). Conversation as a model of instructional interaction. *Literacy Teaching and Learning*, 8(1), 19-46.
- Vanderburg, M. & Stephens, D. The Impact of Literacy Coaches: What Teachers Value and How Teachers Change. Coaching, teaching, and learning [Special issue]. The Elementary School Journal, 111, 1, pp. 141-163)
- Wei, R.C., Darling-Hammond, L., Andree, A., Richardson, N., & Orphanos, S. (2009). Professional learning in the learning profession: A status report on teacher development in the United States and abroad: Technical report. Dallas, TX: NSDC. Available online atwww.nsdc.org/stateproflearning.cfm.
- Whitcomb, J., Liston, D., and Borko, H. (2009). Searching for Vitality in Teacher Education. Editorial, *Journal of Teacher Education*, 60, 5.
- Wilheim, J. D. (2001). Improving Comprehension with Think-Aloud Strategies. New York: Scholastic Inc.
- Wilson, N.S. (2009). Using teacher observation to guide improvements in differentiation. American Reading Forum, Sanibel Island, Florida.