Surveying Visual Literacy Guidelines for Information Design Application

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Abstract. Visual literacy literature is full of guidelines established by various means — from personal taste to established traditions, perception studies, zeitgeist, and big data observations. This chapter explains how fifty guidelines and rules were taken from the literature and classified as a starting point for the creation of a more comprehensive and informed list. Guidelines and rules were randomly selected in this initial effort from some of the fields' most respected theorists and practitioners among other sources. They were assembled to assist undergraduate students enrolled in a course titled *Information Design* to think critically about the design decisions made by professional information designers. This chapter further explains the methodology that went into the list's creation, as well as specifics as to how it was applied in a classroom setting as an instructional aide, with additional reflection for possible enhancement.

Keywords: Design rules and guidelines, information design, instructional method, visual literacy instruction, visual literacy luminaries

Dondis (1973) wrote, "To see has come to mean understanding" (p. 7) in *A Primer of Visual Literacy*, prior to suggesting ways for her readers to learn to see better, further alluding to visual literacy's forming methodology. She suggested that through continued study we can advance our comprehension of what we see, possibly using this vision to better create and communicate visually for ourselves. The primer is book ended by a host of other thought-provoking and similarly prescriptive and established volumes, such as the works of Albers (1963) and Arnheim (1974) that preceded it, to myriad volumes that followed, such as the more recent works of Pettersson (1989), Messaris (1994), and Tufte (1983). These tomes sit among throngs of visually-themed or related trade magazines, blog posts, software manuals, journals, and shelves upon shelves of thought pieces, written to inform, to expand theories, or to guide those engaged in practice about how best to deliver messages to intended audiences. A vast collection of videos and podcasts of varied quality, many posted to the Internet, add another layer to what is known in associated disciplines. Each provides its own take on what works and what anyone interested in being visually literate should know. Categories and sub-categories of study are subsequently innumerable and overwhelming, diluting what is known, while greatly expanding the parameters for debate.

This chapter describes how the guidelines expressed in the literature were identified, categorized, and used to foster discussion in a junior-level undergraduate course titled *Information Design* during the Fall of 2018. Fifty guidelines were selected as a starting point by the author. Students taking *Information Design*, which fulfills a writing requirement and focuses on the visual dissemination of information, were encouraged to expand on this list, either by identifying additional guidelines or adding information on what is known as one component of a larger paper assignment. At a minimum, they were asked to consider these guidelines, as well as the guidelines in their course book, Cairo's *The Truthful Art* (2016), as they analyzed at least three previous infographics or visualizations used to describe a particular concept or phenomena.

The course description for *Information Design* as it appears in the university catalog is:

> Examines knowledge visualization theories and principles. Surveys and evaluates the effectiveness of visual systems and information structures, such as checklists, dashboards, databases, diagrams, questionnaires, and timelines. Students research an area of study and propose a mediated delivery solution in the form of a visualization or infographic (Fitchburg State University, n.d.).

An additional overview appears on the course syllabus:

> *Instructional methods in this course include lecture and discussion, case study analysis, writing, prototyping, practice, presentation, and a final examination. Theories explored will be in the areas of information design, visual epistemology, and visual literacy in reference to visualizations and infographics in all its forms; as well as thoughts and discussion on information anxiety, information politics, digital natives and immigrants, instructional design theories, and information theories pertaining to signal, noise, predictability, and decision making. Students will be tested on their course content knowledge on a final examination. Emphasis is placed heavily on the course project paper and presentation, to include the student's demonstrated knowledge of the relationships between theory and practice in an area of study of the student's choosing* (Howe, 2018a).

Students register for the course as an option to fulfill a junior/senior writing requirement or an upper-level theory requirement for those majoring in Game Design or Communications Media. The latter has students pursuing a concentration in either film/video, graphic design, photography, professional communication, technical theater, or theater. The seventeen students enrolled for the semester-long course wrote on a topic that was distinct from their classmates. Topics analyzed approaches used to visually describe such subject matter as the electoral college system in the United States, North American Bigfoot sightings, and the benefits of foreign language instruction.

Efforts to look at previous visual approaches to explain a concept or phenomena was part of a larger paper assignment. Students divided the final paper into the following sections: 1) an introduction to their topic; 2) the importance of their topic by describing how it fits in a larger context (e.g., how might hurricane prediction fit in the study of meteorology; how might an examination of orcas in captivity fit in the study of all animals held in captivity); 3) an analysis of at least three previous visual approaches used by others to explain this same or similar topic; 4) their own visualization with accompanying text describing how their work is an improvement upon previous work; 5) a written set of learning objectives to describe what a viewer will learn from their proposed infographic or visualization; 6) a reflection on their experience of writing this paper; and 7) a list of any works cited. Section three is the area of focus herein. It requires student thought as to whether or not rules and guidelines were adhered to and to what effect.

Methodology for Setting Up the Grid

To fulfill the course paper requirement, students were given a grid of fifty guidelines found in the literature as an instructional aide. This grid was assembled by the author who was also the professor for the course. Guidelines were set up on the grid using a spreadsheet software to allow for the sorting of data to offer multiple views. However, this process was cumbersome due to the spreadsheet including images inside cells. Ensuring that an image was placed completely inside a cell, or not overlapping its borders, seemed to lessen this sorting issue.

A single row from this spreadsheet can be seen in Figure 1 that was cut up for easier viewing. Looking across the spreadsheet columns, one finds the first column, titled "Category", as a place to classify the rule as pertaining to a particular visual communication element or another information design category. Current categories, which will be undated as the list evolves, include *balance*, *color*, *data*, *form*, *message*, *motion*, *perception*, *principle*, *shape*, *text*, *typography*, and *UX*. The latter is an abbreviation for rules associated with user experience design, a title often associated with interactive media design, such as for dynamic web pages, games, and other applications.

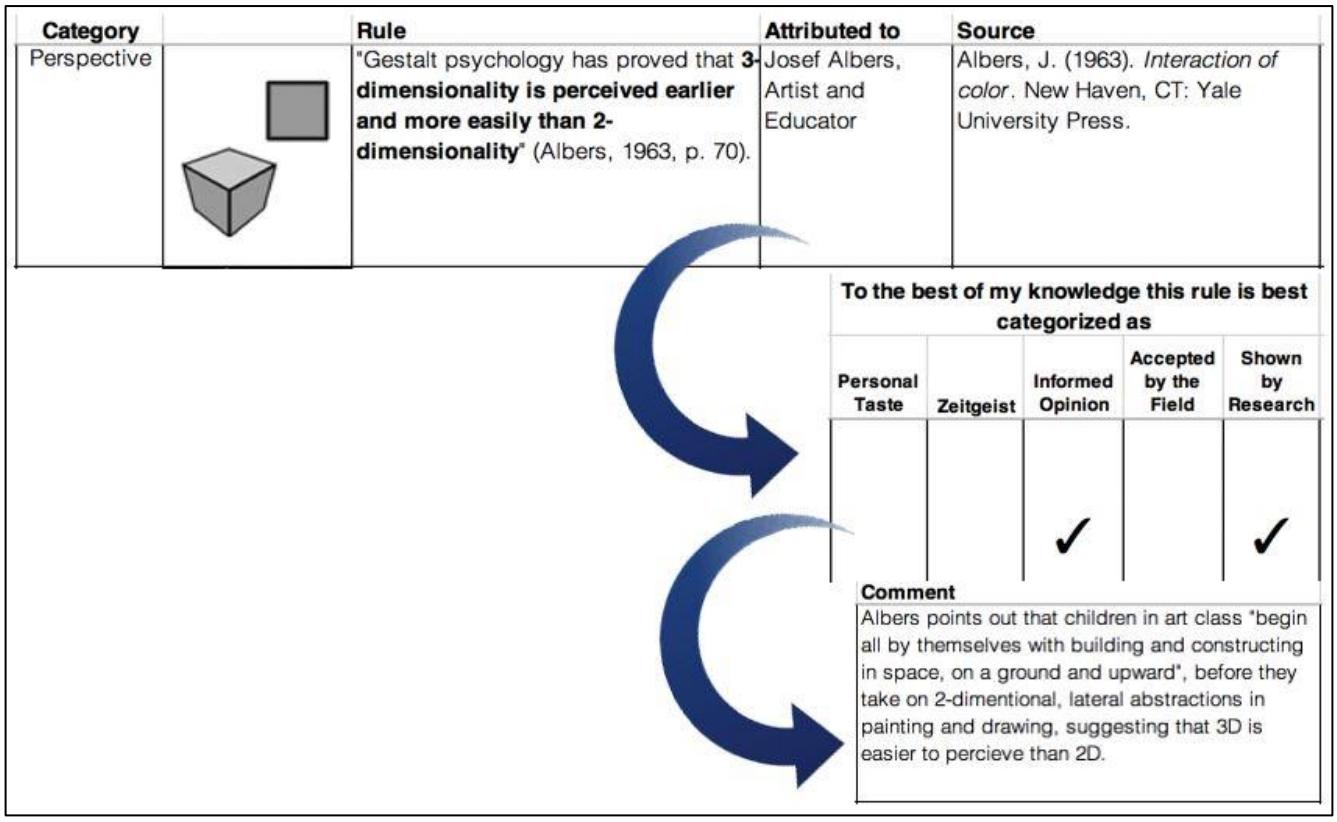


Figure 1. A spreadsheet row, one of fifty, broken in three shows a rule from Josef Albers (1963) analyzed by the author.

Categories of *data*, *typography* and *UX* can be seen as information design and user activity guidelines that may or may not relate directly to visual literacy. A second column was added to post a picture as a visual in an attempt to make it easier for the student to find information or to see an example of what is described on a particular row — a visual cue. The third column lists the "Rule" in boldface type, with the fourth column attributing the rule to its specific individual or individuals, and the fifth column citing the publication source where the rule was found, stated in APA format. The next five columns further judged and classified the rule as formed by personal taste, zeitgeist, informed opinion, accepted by the field, and/or shown by research. Choices made by checkmark across the categories are prefaced by the words, "To the best of my knowledge this rule is categorized as", indicating how the checkmarks are subject to change as new information is

found. A place for comments to describe more about the rule is set up in the last column.

To the best of my knowledge this rule is categorized as

There have been many attempts and approaches to categorize art forms and visual communication elements (Berger, 2012; Berger, 1995; Dondis, 1973; Gonnella, Navetta, & Friedman, 2015; Gowans, 1971). No literature was found that categorized art rules or guidelines specifically. With this in mind, a review of the approaches for critiquing art forms appeared to be an appropriate place to start—a logical place to look for criteria for the categorization of rules and guidelines that influence the creation of art forms.

Berger (1995) identified eight disciplinary perspectives' aesthetic, ethical, feminist, literary criticism, Marxist, psychoanalytical, semiotic, and sociological, for which to look at a text. Chandler (2002) defines a text as "an assemblage of signs (such as words, images, sounds and/or gestures) constructed (and interpreted) with reference to the conventions associated with the genre and in a particular medium of communication" (pp.2-3). Information design, which includes the construction of data visualizations and infographics, is considered a genre under this definition. Berger's (1995) disciplinary list includes the *aesthetic perspective*, involving how technical matters such as lighting, sound, music, kinds of shots and camera work, editing, and related matters in texts (e.g., a specific film, photograph, print piece) affect the ways members of audiences react" (p.170); *ethical perspective*, whereby the reviewer is most concerned with the moral aspects of the work; *feminist perspective*, where the focus is on "the roles of women and how women are portrayed in texts of all kinds" (p.173); *literary criticism perspective*, "which deals with plot, theme, tone, and related concerns" (p.41); *Marxist perspective*, which "would focus on the social and political factors" (p.35); *psycho-analytical perspective*, which is "based on the notion that the human psyche includes an element Freud calls the 'unconscious' that is ordinarily inaccessible to us (unlike conscious-ness and the preconscious) and that continually shapes and affects our mental functioning and behavior" (p. 178); *semiotic perspective*, which shows an interest "in how meaning is created in texts" (p. 33); and *sociological perspective*, which concerns itself with the ways texts "can apply such concepts as roles, status, gender, power, class, deviance, stereotypes, uses and gratifications, and values" (p.37). For the purpose of this analysis, perspectives of *aesthetic*, *ethical*, *psychoanalytical*, *semiotic*, and *sociological* seemed the most relevant.

Categories in Berger's list show possibilities for scientific analyses, such as within the *psychoanalytical* perspective where human perception is studied. Simonton (2004) found four principal perspectives when looking at influences to scientific creativity, which were *logic*, *genius*, *chance*, and *zeitgeist*. Elsewhere and in the arts, Gowans (1971) saw functions of art in four categories, namely *substitute imagery* for accurate representations of the world, *persuasion/conviction* to sell or persuade publics on goods and ideas, *illustration* to tell stories, and *beautification* to make beautiful.

When looking at the list of the fifty assembled guidelines and rules, the author felt that the categories of *personal taste*, *zeitgeist*, *informed opinion*, *accepted by the field*, and *shown by research* made the most sense, at least as a starting point for continued research. These categories seemed appropriate for judging the origins of what made a rule a rule. Envisioned was a continuum, with *personal taste* on one side, carrying less weight as a trusted rule to those *shown by research* at the opposite end of the spectrum. Rules considered in the middle of this trustworthiness spectrum include those that are *accepted by the field*, established by *informed opinion*, and derived from *zeitgeist* (see Figure 2). Whether the items on this continuum would hold together as reliable and distinct categories is open for study. Below are explanations as to the rationale for each category.

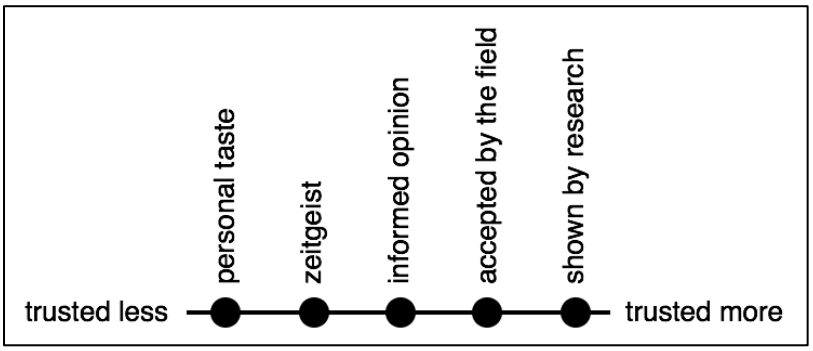


Figure 2. Hypothesis as to the trustworthiness of the proposed rule categories.

Personal Taste

Italian philosopher Giorgio Agamben (1994/1999) defined the "man of taste" as one "endowed with a particular faculty, almost a *sixth sense* … which allows him to grasp the *point de perfection* that is characteristic of every work of art" (p.13). Agamben looked at the derivation of the word "taste", finding it equitable to "knowledge through pleasure, from perceiving the flavor in food to judgments of object quality." He further found it to be near sub-conscious in that we find ourselves attracted to something (or not) before we understand why. "Taste enjoys beauty, without being able to explain it," he wrote (as cited in Chayka, 2018). This lack of understanding seems imperative to a definition of personal taste in this model, especially if one considers it to be at the end of a spectrum. Additionally, as Bourdieu (1984) wrote, "Taste classifies, and it classifies the classifier" (p. 6). This seems to say that one's personal taste says something about her or him. Descriptions of taste veer off from the intended use on this continuum in how Chayka, (2018) differentiated it from "style", stating an opinion that "style is a superficial aesthetic code" while "taste is a wider aesthetic intelligence, able to connect and integrate disparate experiences." This wider aesthetic intelligence seems to move it from personal taste to more of an informed opinion.

Zeitgeist

The etymology of the term zeitgeist finds a combination of German words' Zeit, which means "time", and Geist, which means "spirit." Zeitgeist reflects a "unique spirit", or "a nature or climate that sets (this spirit) apart from all other epochs" (Zeitgeist, n.d.). Simonton (2004) links zeitgeist to science when he points to sociologists who "have argued that discoveries and inventions are the inevitable product of the sociocultural system – often personified as the *zeitgeist* or 'spirit of the times'" (p.10). Zeitgeist also appears easily connected to fields of visual design. For example, Heller (2014) points out that typefaces can be trendy, part of the mood or look of a period, perhaps comparable to trends in automobile and clothing design, an observation made when describing the work of type designer Barry Deck. Heller (2014) makes similar zeitgeist correlations to the work of magazine designer David Carson ("every so often a magazine captures the Zeitgeist"), and the influence that set designer Merle Armitage had on theatre posters and circulars ("He developed a keen ability for making type reflect the Zeitgeist"). With concern to information design today, it seems to be in a phase of long scroll infographics, the jamming of as much information as possible in a single medium, eliminating negative space, such as on a web page or downward on a narrow poster. For reasons such as these, zeitgeist appeared to be

a distinct category for students to consider when thinking about the origin of a guideline or rule.

Informed Opinion

It is difficult to separate personal opinion from informed opinion in the literature as the opinions expressed in the books surveyed are written by experts, widely recognized leaders in the field. Blog writers, on the other hand, may or may not fall into this category. They may write in a more reactionary fashion. Böthig and Hayn-Leichsenring (2017) found the more exposure one has to art the more their appreciation for art increases. More specifically, after subjects viewed images in a lecture, they suggest that "'taste' for abstract art is altered by visual impressions that are presented outside of an artistic context. It appears that the exposure, and perhaps explanation of art is the reason for finding pleasure in the art form. Under this scenario, the subjects now have an informed opinion. Without exposure to such explanations the viewer may dismiss art for any pleasurable qualities, maintaining an opinion on personal taste. It may follow, therefore, that society today is better informed on some topics if we are to believe that there is great interest in locating and following *informed* opinion leaders, such as on social media (Chen, 2018; López & Sicilia, 2017).

Accepted by the Field

There are some rules that are referenced over and over again from book to book, blog to blog, and so on — the sources that practitioners read. By this criterion the rule that "color may appear to change, often dramatically, when moved from one background to another" (Behrens, 1998, p. 300) appears accepted by the field. Albers (1963) wrote, "The fact that the after-image or simultaneous contrast is a psycho-physiological phenomenon should prove that no normal eye, not even the most trained one, is foolproof against color deception" (p.22). Arnheim (1954/1974) quotes Chevreul, "If one views at the same time two areas of different brightness but of the same hue, or of the same brightness but of different hue, in juxtaposition, i.e., bordering on each other, the eye will observe (provided the areas are not too large) modifications that bear in the first case on the intensity of the color and in the second on the optical composition of the two juxtaposed colors" (p.362). Rules such as these may have implications on design decisions, such as designing for the color impaired (see Wong, 2010). The fact that so many luminaries repeat this rule sup-ports that those in the field accept it as fact.

Shown by Research

When research studies were identified to address and provide evidence to validate one of the rules on the list it was classified as "shown by research." This is to say that there is some evidence that the rule has been validated by empirical study, if not through formal observation, survey, or interview. Some examples include the number of studies cited by Elliott (2016). Albers (1963) attributed many findings in his book to studies that he and his students conducted. Still, it cannot be stressed enough that these are preliminary observations and that studies referenced should be checked again and again, perhaps with newer study data as some studies listed on the grid are many years old. Cairo (2016) informs us that "truth is neither absolute, nor relative" (p.86). Factors contributing to human perception, for instance, are subject to multivariate information. Results of similar studies that look at or control different variables may disprove some of the findings in previous studies. This is one area, similar to each of the previous areas (i.e., personal taste, zeitgeist, informed opinion, accepted by the field), where the student's ability to take the time to investigate and to think critically about what is being said comes into play.

Classroom Application

It has been mentioned that the grid was created to help students to critique work in a course titled, *Information Design*. The grid, which is a

guideline list, is added to, updated and maintained by the course professor on a spreadsheet, further saved as a portable document format to be posted to a course management system before each semester that the course is offered. Figure 3 shows one of the current nine pages of the grid.

Students had access to the initial list of fifty guidelines and rules on the spreadsheet, as well as guidelines and rules contained in the course textbook, Alberto Cairo's *The Truthful Art* (2016). They were instructed to use these sources to help them to analyze in writing, aside posted images if possible, at least three past visual approaches to explain the topic that they chose to write about. Specific images that the students analyzed were to be properly cited in APA or MLA style. In addition to the topics cited previously in this document, other students chose to write and propose improvements to depictions created by others on topics such as the solar system, virtual reality, artificial intelligence, color palettes, the structure of the inter-national space station, herbalism, movie theaters in comparison to home streaming, benzo-diazepines, and options concerning birth control. Fourteen of seventeen students were shown to articulate analysis pertinent to rules found in the textbook and on the grid. The level of this analysis varied greatly across papers. A sampling of comments made about reviewed infographics and visualizations, with assumptions made as to the rule that the student's analysis appeared to relate to, demonstrated some patterns. Students were not asked specifically to identify the rules that they referenced. They were asked to use the rules to help them to write this section.

- When reviewing a depiction that defines virtual reality, one student wrote, "They have chosen a white color for the text that contrasts nicely against the dark background." Behren's (1998) observation on Gestalt theories may loosely be applicable, "Color may appear to change, often dramatically, when moved from one background to another" (p.300).

- In this same analysis, the student noted that "There are three sizes of type and two fonts used, one is a blocky font in all capital letters and the other is an artsy cursive font that is italicized. … I can count three different styles of line used and to me there does not appear to be an important distinction about why that line was used instead of the other." The student may have been referring to a guideline from Eric Gill, who is credited to say, "It is a safe rule not to mix different styles of letters on the same page " (Latin, n.d.).

- When examining a graphic on the value of knowing a foreign language, a student noted, "It uses one color (for) all of the countries but this works because it's being used to represent the same variable for each country. Even without any color you would understand the message of the graph so it wouldn't be an issue for people who are color blind." It is possible that this relates to Josef Albers's (1963) guideline, "In most cases the outlines or shape of colors predominate color itself, making them the loudest visually and noticed first" (p.48).

- This same student felt, "Another critique I would have is the designer used the color red for the bar graph but the trend that is demonstrated by the graph is a positive one, so maybe green would have been a more appropriate color." This could relate to Albers (1963) as well, "Everyone has a preference for certain colors and prejudices against them" (p.17).

#	Category	Rule	Attributed to	Source	To the best of my knowledge this rule is best categorized as: Personal Taste	Zeitgeist	Informed Opinion	Accepted by the Field	Shown by Research	Comment
16	Perception	"Man, through his perceptions, has **a need to make wholes of units, (such as) connecting the dots by responding to their attraction"** (Dondis, 1973, p. 33).	Donis A. Dondis, Forner Dean, Boston University School of Public Communication	Dondis, D. A. (1973). *A primer of visual literacy*. Cambridge, MA: The MIT Press.				✓	✓	Dondis describes this with visuals in her famous book, *A Primer of Visual Literacy*. She elaborates on a few dots in a visual field, showing how positioning them far apart seemingly makes them repel one another, while "the closer they are, the stronger their attraction." She points out that "this is the visual phenomenon that inspired ancient man to see the interacting points of light of the stars as representational forms" (p. 33).
17	Perception	"In visual language, **opposites repel, but similars attract"** (Dondis, 1973, p. 33-34).	Donis A. Dondis, Forner Dean, Boston University School of Public Communication	Dondis, D. A. (1973). *A primer of visual literacy*. Cambridge, MA: The MIT Press.				✓	✓	Pettersson (1989) describes "similarity law", stating that "we tend to group impressions on the basis of their similarity" (p. 70). Dondis (1973) demonstrates this phenomena with figures showing objects similar in shape amongst other objects similar in shape. She states that "many other visual affinities govern the law of grouping in the act of seeing, such as size, texture, or town" (p. 35).
18	Text	**"Legends should be written with great care.** They heavily influence our interpretation of image content" (Petterrson, 1989, p. 92).	Rune Pettersson, Research Professor, Institute for Infology, Tullinge, Sweden	Pettersson, R. (1989). *Visuals for information: research and practice*. Englewood Cliffs, NJ: Educational Technology Publications.			✓	✓	✓	Pettersson (1989) defines a legend as "just a label." "In text-books legends may be instructing and directing the reader on what to study in the picture" (p. 270-271).
19	Message	**"An easily read picture can be assumed to have a greater functional, communicative impact than a picture which is difficult to read"** (Petterson, 1989, p. 97).	Rune Pettersson, Research Professor, Institute for Infology, Tullinge, Sweden	Pettersson, R. (1989). *Visuals for information: research and practice*. Englewood Cliffs, NJ: Educational Technology Publications.			✓			Petterson (1989) concudes a section titled, *A Cognitive Model*, with this assumption. Discussions in this section include thoughts on cognitive level and suggestive impact across message and media, to include books, radio, movies, and television (pp. 93-97).
20	Message	**Given two charts, or tables, or maps, of equal simplicity, we know that the one conveying more information is the more elegant. Conversely, of two charts conveying the same information, the simpler is the more elegant."** (Herdeg, 1983, p. 8)	Walter Herdeg, Graphic Designer	Herdeg, W. (1983). *Graphis diagrams*. Zurich: Graphis Press Corp.	✓		✓			Herdeg (1983) wrote that "elegance is a measure of the grace and simplicity of the designed product, relative to the complexity of its functions" (p. 8). Cairo (2016), might add that, "Any act of communicarion involves controlled reduction of complexity, up to the point when reducing matters further would hurt the integrity of the information" (p. 5). He also said, "simplicity is about subtracting the obvious and adding the meaningful" (p. 97). Tufte asserts that less ink is better as long as the message does not lose out. More specifically, he wrote, "graphical excellence is that which gives the viewer the greatest number of ideas in the shortest time with the least ink in the smallest space" (1983, p. 51).

Figure 3. One of nine pages of guidelines distributed in Fall 2018 to students in a course titled *Information Design*.

- This same student noted that “they could have done to better illustrate the point of the graph (by putting) the United States in bold to better emphasize the fact that it is so much lower than the European countries. This would also help separate the United States from the European countries.” Wong’s (2010) observation seems applicable, “What really makes a chart effective are font, color and design and the depth of critical analysis displayed” (p.14).

- A student wrote, “The visualization is a line graph which are ideal to show changes over time, which is the purpose of the graph. The visualization shows college enrollment in languages other than English between the 1950s and sometime after 2015. My first critique would be that we don’t know the exact years that the data starts and ends because the line in the graph starts before 1960 and ends after 2015, but we’re not given an exact year.” This may relate to Cairo’s (2016) maxim, "If someone hides data from you, it's probably because he (or she) has something to hide" (p.47).

- This same student notes, “I think that the graph is fairly easy read, but I think that the grid lines should be a little darker because they’re kind of hard to make out especially against the grey background.” This note may be related to Williams’s (1994) composition rule that emphasizes contrast, "Avoid elements on the page that are merely similar" (p.14).

- From this same student, “I think that the purpose of the infographic is to compare the number of bilingual people in Europe versus those in the United States, but they used two different types of graphs to do that which just makes it confusing. The data is also from different years: the pie chart data is from 2006 and the bar graph data is from various years that don’t match the data from the pie charts. This means that no accurate comparison can be made between the two sets of data. A more effective way to compare would have been to use data from the United States to make a pie chart like (sic) they did with the European countries.” As Tufte (1983) wrote, “Graphics must not quote data out of context" (p. 74). This mismatch of charts placed side-by-side may be seen as an example of this.

- Another student when reviewing graphics to explain artificial intelligence, said “I have no idea what is going on with this graph. The x-axis is not labeled, but it’s clear that are meant to be years, but the y-axis is a mystery to me. It’s a percentage of some sort, ranging from 0% to .00024%. I have no idea what that means because it isn’t labeled, and the article I pulled this from talks nothing about it. It shows that AI is rising from about 1955 to the late ‘80s, and then enters a downslope, but that all means nothing to me because I don’t know what the y-axis is. I don’t know why the axes wouldn’t be labeled, it completely negates any point to having the graph in the background.” This quote from Cairo (2016) may be applicable, “If words are sometimes useless by themselves, so are charts, maps, diagrams, and illustrations” (p.6).

- The student who examined charts related to “big foot” sightings said of one infographic that it, “did not use distinct enough colors when distinguishing state laws, two shades of blue and two shades of green were used, making it hard to read at times.” Albers (1963) wrote, “we should … encourage working with very different colors so that light and color intensity may compete with

and balance each other" (p.50). Alber's comment was in regards to the use of stripes. It may also be applicable here.

- This same student wrote, "This infographic helps to see where there is a congestion of Bigfoot sightings but it makes it impossible to know how many sightings there are or when they occurred, or even where exactly they occurred. The icons used to indicate Bigfoot sightings also come in different colors, but this infographic has no key to establish what the different colors mean, if anything. Overall this infographic is a confusing mess that is impossible to draw any conclusions from other then (sic) the general area that Big Foots seem to get spotted." Tufte's (1983) commentary to "forgo chartjunk" may be relevant (p.121).

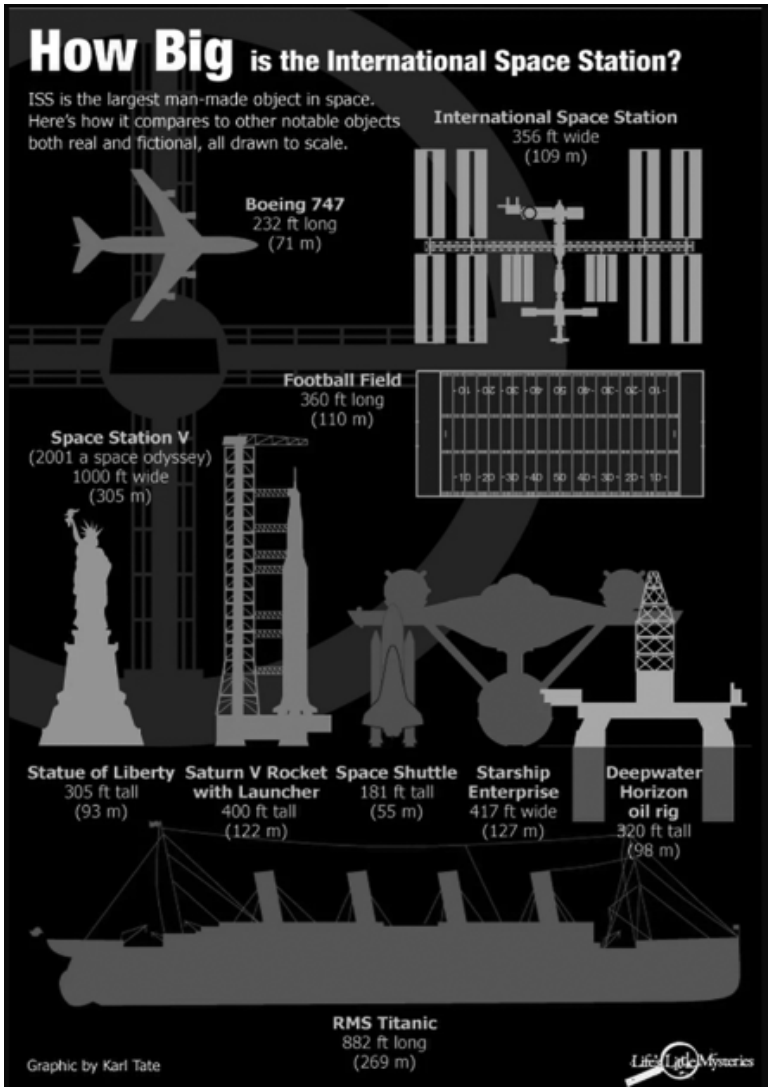


Figure 4. One of three images about the International Space Station presented and analyzed by a student in the course *Information Design*. This image originally appeared in color (Tate, 2016).

- A student who researched drawings of the International Space Station wrote of one graphic, shown in Figure 4, “This image compares the ISS to a number of different things in relation to its size to depict how large the station is. It pits the ISS against a football field, a Boeing 747, the Statue of Liberty, the Saturn V rocket with its launcher, a space shuttle, an oil rig, the RMS Titanic, the Starship Enterprise. And lastly, Space Station V from ‘2001: A Space Odyssey’ … My only critique is that the Space Station V is a bit hard to see since it is behind everything else.” Cairo (2016) wrote, “The purpose of your graphics should somehow guide your decision of how to shape the information” (p. 51). Perhaps the use of a chart that layered information was a bad choice. The artist noted that the choice of the darker color was intentional. “Since the 2001 space station is large, I wanted it to lurk in the background behind the brighter foreground objects. And its presence quietly makes the point that, at least back in the Space Age, we were expected to be building much larger space structures, by the early 21st century”, he wrote (K. Tate, personal communication, November 1, 2019).

- Another student looked at graphics that depicted various forms of birth control, “Ultimately, the infographic by the CDC seems to be the most effective. It is visually interesting and contains drawings of the type of contraception to help someone who might not know what it is by name. The facts and figures are clear and easy to understand. The Bixby Center for Global Reproductive Health’s graphic also is fairly effective. The use of color is not overwhelming and has a simple font. While it contains less information than the CDC’s graphic, it still has the most important information presented and easy to understand.” Although both charts seem effective, Herdeg’s (1983) mantra, “Given two charts, or tables, or maps, of equal simplicity, we know that the one conveying more information is the more elegant. Conversely, of two charts conveying the same information, the simpler is the more elegant.” (p. 8). This quote appears applicable.

These and other comments demonstrate a preponderant pattern of looking at color in data graphics, infographics, and visualizations. Of the seventeen students, thirteen commented on the use of color in the works that they reviewed. Comments concerning color contrast were common, such as foreground and background relationships and its effect on readability, or how contrast aids those who are colorblind. Another looked at how the use of certain colors can signify trends as positive or negative. Yet another looked at how the lightness or darkness of grid-lines affect the reading of data. Another observed how different colors can be used to mark data categories. One student looked at historical depictions of color as the basis for his paper’s full topic.

Seven of the seventeen students addressed color when proposing a graphic as an improvement on previous works. One student wrote, “Many of the previous timelines I witnessed used very dull and boring colors. I plan on making my timeline stand out by using strong colors.”

Whether the frequency of color analysis across these papers was related to the rules and guidelines supplied to students is open for debate. Only five of the fifty rules and guidelines presented to students were categorized as related to color. Color was also touched upon at several junctures in course instruction.

Another pattern found twelve of the seventeen student papers describing the use of type, text, or fonts used by the designers of previous work.

Figure 5. One of three images about birth control presented and analyzed by a student in the course Information Design (Effectiveness of family planning methods, n.d.).

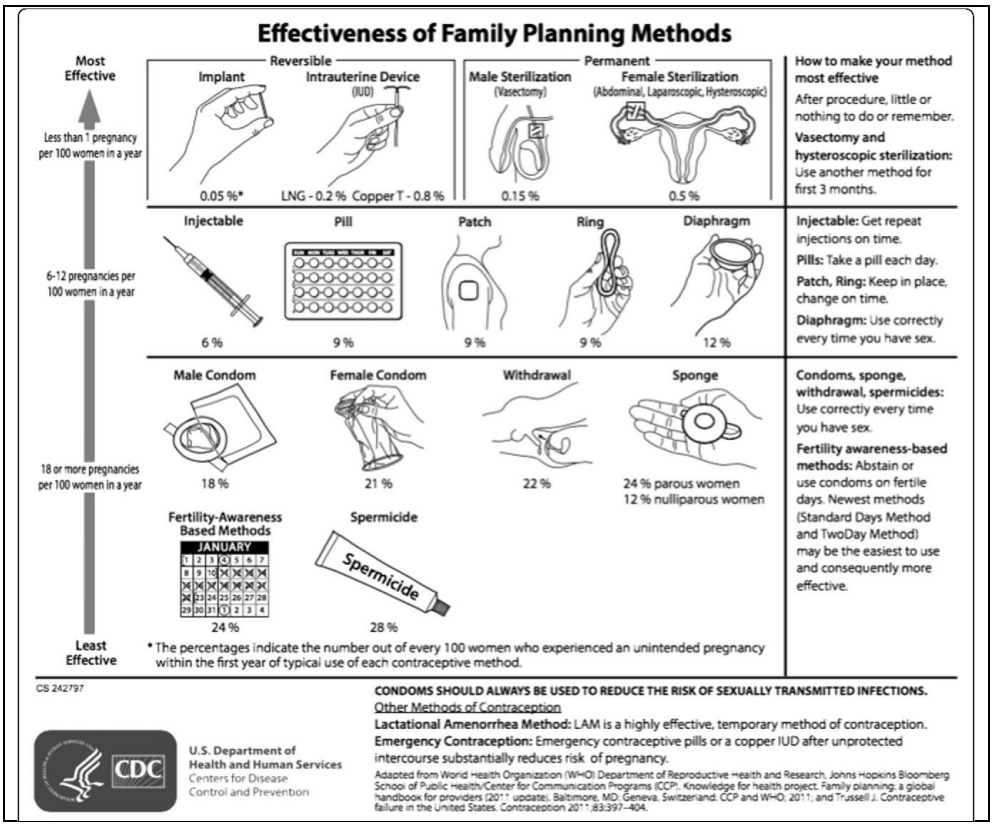
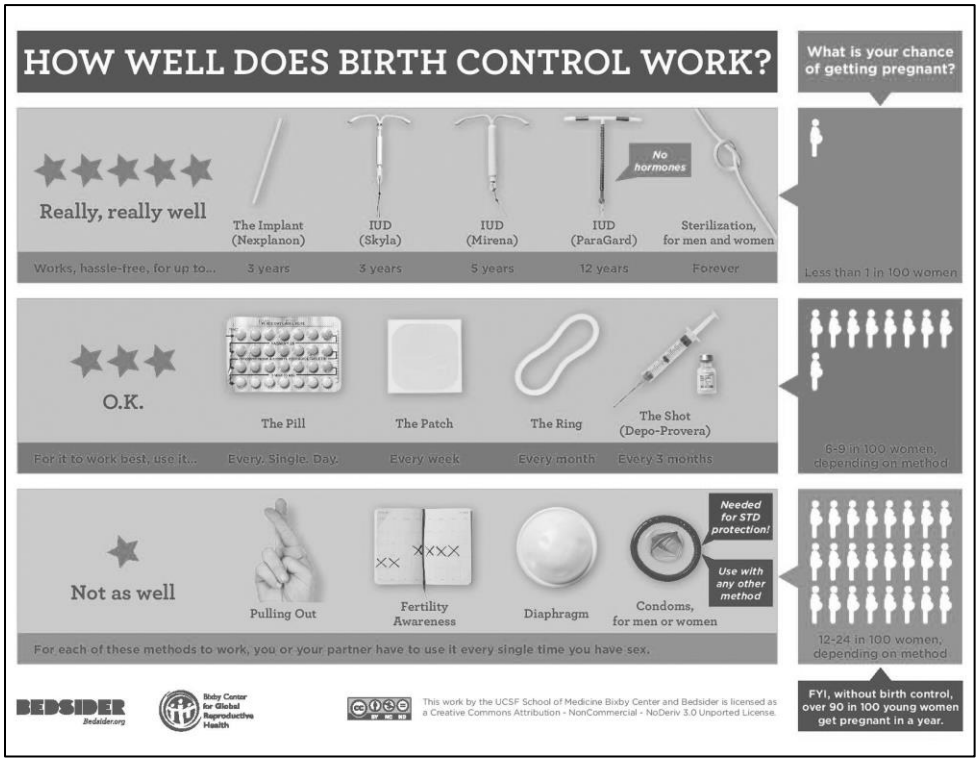


Figure 6. One of three images about birth control presented and analyzed by a student in the course Information Design. This image originally appeared in color (Educational materials for patients and students) (Bedsider, 2018).



Reflection

Students in this undergraduate program develop visual literacy skills in foundational courses, such as a First Year introductory requirement titled *Message Design*, further applying these skills in practice in their respective field's production courses, such as film/video, graphic design, photography, and professional communication. *Information Design* is an upper-level theory elective course in this program. Students enrolled are typically at the junior or senior level. They had to complete two prerequisite courses to take *Information Design*, one of which was *Message Design*. As a result, they should have some understanding as to how data depictions are or will be perceived by audiences from the standpoint of visual literacy.

Students were required to tell a story about the data that they reviewed in the course. The assignment sheet specifically asked students to "pick a complex topic and develop a means of communicating this topic to others as a mediated and visual presentation. Solutions for imparting information must be unique and hopefully an advancement to the work of those who have disseminated this information before" (Howe, 2018b). It is possible that students may have been more concerned with telling the story behind the data than the visual elements that went into it. Although the instructions subsequently made this latter goal more explicit.

Students did allude to visual literacy in some respects. Frequent student notations about how color was applied to the graphics in previous work as well as how color can be used in proposed work may be attributed to course instruction where the topic was visited several times over the semester, both in lecture and assigned readings. Other rules and guidelines not related to color were also covered, but less frequently based on a review of notes and to the professor's recollection.

A few students did encounter and describe treatments such as gridlines, contours, and backgrounds. This description relates to graphic elements, such as the use of dots, shapes, lines, textures, and so on in composition, building blocks that are of concern to visual literacy study. John Debes defined visual literacy as

> "a group of vision-competencies a human being can develop by seeing and at the same time having and integrating other sensory experiences. The development of these competencies is fundamental to normal human learning. When developed, they enable a visually literate person to discriminate and interpret the visible actions, objects, symbols, natural or man-made, that he encounters in his environment. Through the creative use of these competencies, he is able to communicate with others. Through the appreciative use of these competencies, he is able to comprehend and enjoy the masterworks of visual communication" (What is visual literacy, n.d.).

This definition seems heavily focused on literacy (e.g., seeing, sensing, discriminating, interpreting, comprehending), which the students demonstrated; with an ardent sentence about putting these competencies into action (e.g., create, communicate), which the students demonstrated as well, but not vigorously articulated in the narrative about their proposed solution. Benoit's (2015) definition similarly focuses on both seeing and doing, but with more specificity than Debes in terms of outcomes, "a set of abilities that enables an individual to effectively find, interpret, evaluate, use, and create images and visual media" (p.52). Images and visual media are created in this view. Theory is put into practice. Students in this course worked to advance past work into new work, but did little to articulate what was done in terms of putting visual literacy in to practice in their papers. With the guideline and rules list in hand it was hoped that the students would make this more explicit. Instructions in this regard need to be more explicit as to what the expected outcome of this work should be.

How text is applied to graphics was a frequent topic in *Information Design* lectures

and materials, although there were only a pair of rules or guidelines on the list provided to students that pertained to it, such as “Legends should be written with great care. They heavily influence our interpretation of image content” (Petterrson, 1989, p.92). Eric Gill’s, mentioned previously, was the other (Latin, n.d.). These rules and guidelines aside others from Tufte (1983), Phinney (2011), and Wong (2010) demonstrate the importance of type in information design problems. It seems fair to say that text and graphics are inextricably linked in most data graphic presentation. Venn diagrams, pie charts, line graphs, and so on often require text to describe trends, tell stories, offer compare-sons, and show causality.

The assignment was designed in part to fulfill a university writing requirement with a course focus that could be seen to be more about the student’s critique of previous work by others (a review of at least three works were required) and less on their proposed revision (one possible solution drawing information from the same or similar data). Students were told in the instruction handout to describe how “the information presented (in previous work) follow the principles found in the literature.” This was footnoted with “A list of theories and suggested rules from the literature surrounding information design is presented on Blackboard, under the heading, *A Sampling Research and Rules* for your reference. Consider additional research to update older rules with the latest information.” A portion of the list can be seen in Figure 3. Blackboard, for the record, is the course management system used to provide students online access to a host of course materials. By describing one solution against three previous works with no specific request to apply the principles to that solution, students were in a situation where the description of colors or any visual communication element, or guideline or rule was less likely. Students were tasked to complete the proposal section in writing with a simple drawing only to show their thinking in this regard. The instructions called for a “Proposed Infographic or Visualization or Storyboard (Drawing/Picture) — follow-up the text descriptt-ion by pasting or attaching a picture of your proposed infographic or visualization or story-board as an elaborate draft or sketch or if possible and if you have the skill, the completed product. Be sure to propose something rich with data with high visual impact” (Howe, 2018b, p.1). Future instructions concerning the proposed solution should call for more student recognition of the rules and guidelines list.

A goal of this assignment was for students to think critically about the rules and guidelines from the literature of visual literacy and information design. They were to make judgments on the communicative effectiveness of the infographics and visualizations that they chose to review, further encouraged to recognize any rule that they could find in the literature to help them to make these judgments. In this respect, the assigned analysis was a success. Students appeared to apply many of the guidelines from the list, although not specifically, as well as those that can be found in the course text and as described in classroom discussions. Connections in this regard were made.

The assignment needs improvements in requirements because students did not reference specific rules or guidelines in their papers (i.e., using in-text and works cited references to cite authors across the list). This needs to be made clearer in future course offerings. Also, there were no suggestions made by students to the professor to append more rules or guide-lines to the list, nor any suggested edits to update the existing list, such as where the rule should be placed on the continuum (i.e., personal taste-zeitgeist-informed opinion-accepted by the field-shown by research). With encouragement and an update to the requirements, the professor and author of this chapter is optimistic that this will change.

References

Agamben, G. (1999). *The man without content*. Stanford, CA: Stanford University Press (Original work published in 1994)..

Albers, J. (1963). *Interaction of color*. New Haven, CT: Yale University Press.

Arnheim, R. (1974). *Art and visual perception*. Berkeley, CA: University of California Press. Original work published in 1954).

Behrens, R. R. (1998). Art, design and Gestalt theory. *Leonardo*, 299-333.

Benoit, G. (2015). Visual communication as an information activity. *Journal of Visual Literacy*, *34*(2), 51-67

Berger, A. A. (2012). *Seeing is believing: An introduction to visual communication* (4th Ed.). New York: McGraw-Hill.

Berger, A. A. (2011). *Seeing is believing: An introduction to visual communication*. New York: McGraw-Hill Higher Education.

Berger, A. A. (1995). *Essentials of mass communication theory*. Thousand Oaks, CA: Sage Publications, Inc.

Bourdieu, P. (1984). *Distinction: A social critique of the judgment of taste*. Cambridge, MA: Harvard University Press.

Böthig, A. M., & Hayn-Leichsenring, G. U. (2017). Taste in art—Exposure to histological stains shapes abstract art preferences. *I-Perception, 8*(5). doi:10.1177/2041669517736073

Cairo, A. (2016). *The truthful art*. Berkeley, CA: New Riders.

Chandler, D. (2002). *Semiotics: The basics*. London: Routledge Taylor and Francis Group.

Chayka, K. (2018, April 17). Style is an algorithm [Web log post]. *Racked*. Retrieved April 24, 2018 from https://www.racked.com/2018/4/17/17219166/fashion-style-algorithm-amazon-echo-look

Chen, Y. (2018). A novel algorithm for mining opinion leaders in social networks. *World Wide Web,* 1-17. doi:10.1007/s11280-018-0586-x

Dondis, D. A. (1973). *A primer of visual literacy*. Cambridge, MA: The MIT Press

Elliott, K. (2016, May 2). 39 studies about human perception in 30 minutes. *Medium*. Retrieved from https://medium.com/@kennelliott/39-studies-about-human-perception-in-30-minutes-4728f9e31a73

Ferro, S. (2018, October 19). 10 secrets of user experience designers [Web log post]. *Mental Floss*. Retrieved October 25, 2018 from http://mentalfloss.com/article/560531/secrets-user-experience-designers

Fitchburg State University (n.d.). Fitchburg State University 2018-2019 undergraduate catalog. Retrieved from https://catalog.fitchburgstate.edu/

Gonnella, R., Navetta, C., & Friedman, M. (2015). *Design fundamentals: Notes of visual elements and principles of composition*. San Francisco: Peachpit Press.

Gowans, A. (1971). *The unchanging arts*. Philadelphia; J. B. Lippincott Company.

Heller, S. (2014). *Design literacy. Understanding graphic design*. New York: Allworth Press.

Herdeg, W. (1983). *Graphis diagrams*. Zurich: Graphis Press Corp.

Howe, R. (2018a, Fall). *COMM 4010 Information Design* [Syllabus]. Fitchburg, MA: Communications Media Department Fitchburg State University.

Howe, R. (2018b, Fall). *COMM 4010 Information Design: course project instructions* [Assignment]. Fitchburg, MA: Communications Media Department Fitchburg State University.

Latin, M. (n.d.). A guide to combining fonts. *Better Web Type*. Retrieved August 23, 2018 from https://betterwebtype.com/combining-fonts-guide

López, M., & Sicilia, M. (2017). Identification of loyal opinion leaders on twitter. *Cuadernos De Gestión,17*(1), 105-124. doi:10.5295/cdg.140508ml

Messaris, P. (1994). *Visual literacy: Image, mind, & reality*. Boulder, CO: Westview Press.

Pettersson, R. (1989). *Visuals for information: research and practice*. Englewood Cliffs, NJ: Educational Technology Publications.

Phinney, T. (2011). How to explain why typography matters. *Communication Arts*, *53*(3), 28-30.

Simonton, D. K. (2004). *Creativity in science: Chance, logic, genius, and zeitgeist*. Cambridge, UK: Cambridge University Press.

Tate, K. (2016, June 11). How big is the international space station. Retrieved from http://www.karltate.com/?p=115

The Regents of the University of California. (2018). Educational materials for patients and students. Retrieved from https://beyondthepill.ucsf.edu/educational-materials

Tufte, E. R. (1983). *The visual display of quantitative information*. Cheshire, CT: Graphics Press.

U. S. Department of Health and Human Services, Centers for Disease Control and Prevention. (n.d.): Effectiveness of family planning methods. Retrieved from https://www.cdc.gov/reproductivehealth/contraception/unintendedpregnancy/pdf/Contraceptive_methods_508.pdf

What is visual literacy? (n.d.). International Visual Literacy Association. Retrieved from https://visualliteracytoday.org/what-is-visual-literacy/

Wong, D. (2010). *The Wall Street Journal guide to information graphics*. New York: W. W. Norton & Company.

Zeitgeist. (n.d.). In *Merriam-Webster*. Retrieved from https://www.merriam-webster.com/dictionary/zeitgeist.

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