CAN DOING ART MAKE YOU EVEN MORE COMMUNICATIVE & CREATIVE?

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SUMMARY

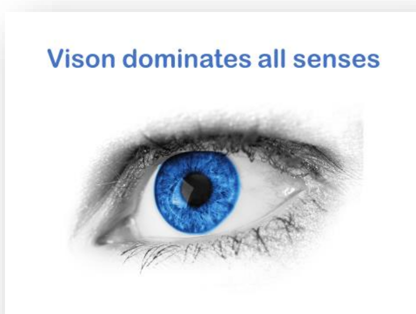
This paper identifies and illustrates three benefits of doing, not just studying, art. They are: 1) seeing more, literally and metaphorically, and as result, being more creative; 2) applying composition rules to improve communication; and 3) using thinking methods, based on basic brain literacy, to be more creative. Basic brain knowledge appears throughout the paper providing scientific support for the paper's content. Some of the paper's creative-thinking ideas are shown to connect with and build on Genrich Altshuller's views.

INTRODUCTION

Background

Vision dominates our other senses (Figure 1) -- hearing, smelling, tasting, touching, and balance -- because, according to neuroscientists, the light energy (photons) detected by our eye's retina connects, via the optic nerve, to more parts of our brain than any other of our senses (Connor 2018, Medina 2008).

Figure 1: Our sense of sight interacts with more parts of our brain than any other sense. (Source: Pixabay)



Therefore, if we want to effectively learn or teach a subject, understand or explain something, or create something new, we should make frequent and effective use of our and others' vision. Stronger vision abilities can help us work and live smarter -- especially be more communicative and creative.

Even though vision dominates, we often lack attention, a liability called "inattentional blindness." This "illusion of attention" means that "we experience far less of our visual world than we think we do" (Chabris and Simons 2009). We may visually and otherwise miss much, especially creative opportunities. For example, why didn't Western Union invent the telephone, U.S. Steel the minimill, and IBM the personal computer? (Kaufman and Gregoire 2015). Doing visual arts can, as shown in this paper, reduce inattentional blindness by enhancing physical and metaphorical vision.

Research and experience, as summarized in this paper, reveal that scientists, engineers, technologists, and others who practice, as amateurs or professionally, one of the visual arts (such as drawing, painting, sculpture, crafts, and photography), develop enhanced observational professional capabilities. They see what others don't. Accordingly, they more thoroughly define issues, problems, and opportunities; more effectively communicate understanding of challenges and suggested resolutions of them; and generate more creative solutions.

Purpose

This paper's goal is to encourage you, whether a student or practitioner, to explore doing a visual art or, if you are already an artist, to broaden and deepen your understanding of the potential professional benefits of doing a visual art. Doing art as an avocation will, as demonstrated in this paper, enhance your vocational communication and creativity knowledge, skills, and attitudes.

Note the focus on doing, not just studying, visual arts. My experience and research suggest that art's professional (and personal) value emanates from actively doing it. Incidentally, I suspect that some of what I share is applicable to the performing arts (e.g., see Root-Bernstein 2008).

More seeing and, relatively speaking, less looking, is an inevitable by-product of practicing visual arts. Really seeing gradually becomes habitual for artists. When looking at anything, artists, relative to others, tend to see composition, shapes, colors, values, and details. "Drawing is the discipline by which I constantly rediscover the world," noted the Dutch medical doctor and artist Frederick Franck, who also wrote "I have learned that what I have not drawn, I have never really seen."

Let's investigate ways in which scientists, engineers, and members of other professions and disciplines have and can benefit from doing visual arts. They benefit because they more effectively use their cognitive resources. They take a whole-brain approach, that is, more effectively use their left and right hemispheres, their conscious and subconscious minds, and other elements of brain literacy. After all, as noted by Betty Edwards (1999), a "half brain is better than none; a whole brain would be better." More specifically, consider three major benefits doing visual arts.

BENEFIT 1: YOU USE ENHANCED VISION, LITERALLY AND METAPHORICALLY, TO BE MORE CREATIVE

Seeing, Not Just Looking

A principle guiding drawing, painting, or sculpting, is to draw, paint, or sculpt what we *see* contrasted with the way we think something should look. For example, before taking drawing lessons, if I were asked to draw a boat, tree, dog, or other object, I would start thinking mainly about what such an object should look like and try to draw it in that preconceived manner. Now, having benefited from drawing lessons, I draw what I *see*, that is, composition, shapes, and values.

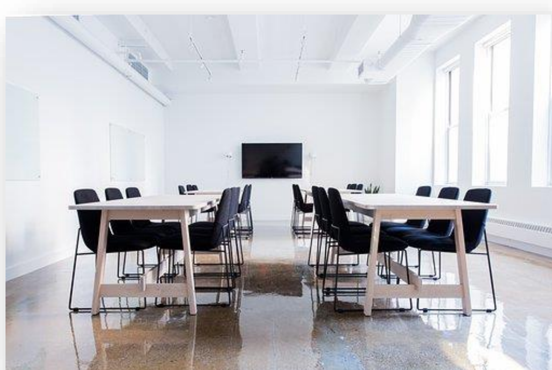
Artists first carefully examine the object to be drawn and then, and only then, draw what they *see*. While each artist has his or her own style of converting what is seen to pencil or brush strokes on paper or shapes in clay, the process is driven by careful observation. Even if the resulting artwork is not successful, the artist will still have really *seen*, probably for the first time, the object.

British Prime Minister Winston Churchill (2013), who took up art at age forty, expressed the intensity of that "first-time" *seeing* by saying "I found myself instinctively, as I walked, noting the tint and character of a leaf, the dreamy purple shades of mountains, the exquisite lacery of winter branches… And I had lived for over forty years without ever noticing any of them except in a general way."

When I look consciously at any object, even though I have no interest in drawing it, I *see* more, especially shapes, shadows, and details, then I used to. Joan Nagle (1998) draws a parallel between artists and writers by observing that both think first and then act. She recalls an incident when Roger Fry, a painter and art critic, asked a little girl how she approached drawing. Her answer: "First I have a think and then I put a line around it."

For example, assume that, prior to my drawing studies, you put me in a sparsely furnished, mostly white room -- white walls, ceiling, and furniture -- like that shown in Figure 2 and asked me what I saw.

Figure 2: The artist gets beyond just looking to really *seeing*, such as the infinite shades of "white" in this room. (Source: Pixabay)



I suspect I would have immediately noted the tables and chairs, monitor, and windows. Now, as an amateur artist, my observation would quickly include *seeing* a wide spectrum of shades of white, that is, a range of values. This value spectrum would be prominent in my *seeing* the room because drawing the room, or anything, in two dimensions on a sheet of paper so that it appears three dimensional, requires applying pencil strokes that capture the value variations. I would have the preceding response even though you did not ask me to draw the room or any part of it.

Leonardo da Vinci exemplifies the *seeing* -- not just looking -- principle in that he was said to have "quickness of vision." That unusual ability is illustrated by his revealing of the intricacies of the human hand, his drawings of turbulence caused by water flowing around obstacles, and his capturing the movement of birds' wings during flight. The accuracy of his flowing and flight drawings was substantiated in modern times by slow-motion cameras (Wallace 1966). Much more recently, and in a similar spirit, baseball Hall of Famer Yogi Berra (1998) said "You can observe a lot by watching."

Enhanced observation or more *seeing* and, relatively speaking, less just looking, is an inevitable by-product of practicing visual arts such as drawing, painting, sculpting, and photography. S*eeing* gradually becomes habitual for artists. As Ralph Waldo Emerson noted, "The mind, once stretched by a new idea, never returns to its original dimensions," and so it is once we do visual arts.

Confucius said "A common man marvels at uncommon things; a wise man marvels at the common place." Perhaps practicing the visual arts enables us to make the invisible visible, *see* more, discover more, appreciate more and, as result, be less common and be wiser for our benefit and for the benefit of those we work with and serve.

So What?

So, what has habitual enhanced *seeing* -- not just looking -- derived from doing visual arts, got to do with engineering, science, or whatever you do? Improved *seeing*, whether literally as described here or possibly, by extension, metamorphically, further enables you to more accurately define an issue to be resolved, a problem to be solved, or an opportunity to be pursued. To paraphrase and expand the common expression "a problem well defined is half solved." An issue, problem, or opportunity more completely and accurately seen, both physically and figuratively, is more effectively resolved, solved, and pursued.

Furthermore, really *seeing* can lead to finding opportunities in unexpected places, most notably right in front of us, and generating creative results. "Discovery consists not in seeking new landscapes," according to the French essayist, Marcel Proust, "but in having new eyes." Consider some examples of how improved seeing, literal and perhaps metaphorical, enhanced understanding of a challenge and/or led to creative results.

Leonardo da Vinci Started Pathology: As a teenager, Leonardo da Vinci spent some inspiring time in Florence where, among other experiences, he learned about and aspired to become one of the "ingenios," the engineer/artists. Later, da Vinci, now the engineer-artist-scientist, dissected more than thirty human cadavers and many animal corpses. He conducted the first documented autopsy, in effect making da Vinci pathology's founder (Gelb 2004, Lankford 2017, Shlain 2014, Wallace 1966).

Because da Vinci *saw*, and could draw, now others could *see* what they had not *seen.* He said, there are three classes of people: "those who *see*, those who *see* when they are shown, those who do not *see*," which supports the idea that doing a visual art can enhance the sight of those who want to *see* more.

Alexander Fleming Discovered Penicillin*:* In 1928, Scottish biologist Alexander Fleming, while conducting research on antibacterial substances, inadvertently contaminated one of his slides with the mold penicillium notatum. Later he *saw* a circle around the mold that was free of bacteria. Maybe the mold came through an open window or from a crumb of moldy bread. Regardless, this accident and Fleming's ability to *see* the circle led to the discovery of penicillin, as named by him. His discovery destroys bacteria that cause many types of infections and inspired scientists to develop other antibacterial drugs (Johnson 2010, Van Doren 1991).

Santiago Calatrava Designed Unique Structures: The architectural and engineering firm headed by Calatrava, the famous Spanish-born engineer and architect, designs creative, now signature structures. Examples include a gently twisted Malmo, Sweden skyscraper influenced by *seeing* the human spine; a portion of the Milwaukee, Wisconsin art museum with bird-inspired wings that open to the sky to moderate interior illumination; and the Lisbon, Portugal train station, shown in Figure 3, which was inspired by the *sight* of a palm tree forest.

Figure 3: Architect-engineer Santiago Calatrava integrates art into his architectural and engineering designs. (Source: Pixabay)

Calatrava earned a degree in architecture and a doctorate in civil engineering and he has held engineering licenses in the U.S. Calatrava draws, paints, sculpts, and does ceramics. He synthesizes some of his interests with this thought: "I have tried to get close to the frontier between architecture and sculpture and to understand architecture as an art." And maybe we could replace architecture with engineering, or add engineering to architecture based on Calatrava's engineering-architecture masterpieces. According to an article in the Smithsonian, "Being an engineer frees him to make his architectural daring" (Encyclopedia.com 2018, Guest et al. 2013, Santiago Calatrava 2018).

Norman Woodland Conceived the Bar Code: In 1948, Bernard Silver, while an electrical engineering graduate student at Drexel Institute of Technology, learned that a food store chain wanted to speed up the checkout process at their stores. He partnered with Norman Woodland, a friend and fellow graduate student, and they started to search for a system. Their first working model used fluorescent ink, but it faded and was expensive. This was the beginning of what proved to be a persistent effort with a breakthrough ending.

Eventually, mechanical engineer Woodland moved to Florida, near the beach, and continued to work on the project, now inspired by Morse code which he had learned as a Boy Scout. He began to think about dots and dashes. One day, during the winter of 1948-49 while he was at the beach lying back in a beach chair, he stretched out a hand, put it in the sand, and pulled it back. He looked at his finger marks in the sand, *saw* lines of varying width and spacing, and conceived the bar code concept (Adams 2014, Boehler 2012, Fox 2012).

Wendy Crone Enhanced Analysis: Artist Crone, PhD, is a Professor in the Department of Engineering Physics at the University of Wisconsin - Madison, where she also has appointments in the Departments of Biomedical Engineering and Materials Science and Engineering. Wendy's research specialty is solid mechanics, which has connected her to nanotechnology and biotechnology. She does sculpting and pottery and also paints, as shown by one of her pieces in Figure 4.

Figure 4: Oak Hill (pastel) by Wendy Crone. (Source: Crone).

In her research, Wendy uses microscopy, that is, instrumentation that provides images of objects not visible to the naked eye. She says "The ability to *see* detail and attend to subtle changes in images is critical to my engineering research" and she believes that "these skills are enhanced by my practice of painting." Her view is similar to that of the German/Swiss painter Paul Klee who said "Art does not reproduce the visible; rather, it makes visible" (Crone 2018).

As a teacher, Wendy uses her art knowledge and skill to prepare visuals that enable students to understand complex concepts. Her art also supports collaboration with professional artists and scientists in preparing presentations, writing articles and papers, and designing museum exhibits (Crone 2010).

Philo Farnsworth Invented Television: In 1920, an observant and curious 14-year old farm boy, Philo Farnsworth, *saw* neat parallel rows of crops on his uncle's Idaho farm (Figure 5). This caused him to think of electronically capturing an image, in a point-by-point and then line-by-line manner, transmitting them, and reassembling them into the original image. He shared the concept with his high school chemistry teacher, Justin Tolman, who Farnsworth later credited with providing key inspiration and knowledge.

Figure 5: A very observant Philo Farnsworth *saw*, in a field of row crops, the basis for television. (Source: Pixabay)

Philo Farnsworth persisted, continued his study and experimentation and, at age 20, he demonstrated the first working television that used electronic scanning on both pickup and display devices. As you may have guessed, the person who *saw* in a farm field the possibility of electronically capturing and transmitting moving images was just beginning his creative work. He eventually received over 130 patents for his many and varied inventions (Brigham Young 2019, Michalko 2001).

Stephen J. Ressler Represented Three Dimensions: A Professor Emeritus of the U.S. Military Academy, Ressler, PhD, PE, works in oil, water color, pencil, and pen and ink. He creates mostly landscapes and architectural images, as illustrated by one of his paintings shown in Figure 6. He says "doing art has been immensely influential in my development as an engineer and, especially, as an engineering educator."

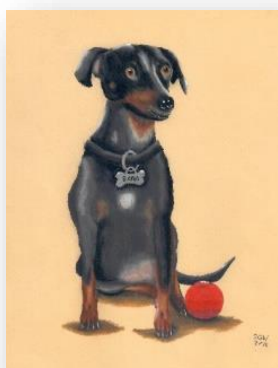
Figure 6: Cathedral of Notre Dame at Chartres (oil on canvas) by Stephen Ressler. (Source: Ressler)

Ressler describes the benefits of being an engineer-artist as dual directional. *Doing art* helps him be a more effective engineer because now he is more able to develop two-dimensional representations of three-dimensional objects; *see* details he may otherwise have missed; use sketches to communicate, particularly in design, and on a chalkboard when teaching; compose presentations; and develop three-dimensional computer models.

Going in the opposite direction, *doing engineering* has made him a more effective artist because he can *see* and represent three-dimensional objects in two dimension, *see* and represent detail, and master perspective drawing methods (Ressler 2018).

Stuart G. Walesh Enhanced Communication: I am an amateur artist working in pencil and acrylic and preferring realism such as landscapes and animals, with Figure 7 being an example of the latter. A decade ago, after a five-decade lapse from freehand drawing instruction in grade school and on a whim, I took a one-day freehand pencil drawing course, made progress, and enjoyed it. Classes and drawing continued, initially as a diversion but also because, over a few years, I gradually *saw* intriguing connections between doing art and doing engineering (e.g., see Walesh 2016b, 2017).

Figure 7: Rescued Sarah Now Has a Home (pencil and acrylic) by Stuart Walesh. (Source: Walesh)



Some of my now learned insights are identical to those already shared by other artists in that, broadly stated, doing engineering enables me to do art and doing art enables me to be a more effective engineer. One example of the latter is learning and using composition rules in art and then realizing their value in using what readers and audiences *see* to enhance communication in my engineering projects. The next major section of this paper describes how composition rules from the art world can improve communication in many professions and disciplines. Being aware of what others *see* and how they interpret it is the second benefit of doing visual arts.

Seeing More Metaphorically: The preceding examples stress enhanced literal, that is, physical seeing as a professional or vocational benefit of doing visuals arts as an avocation. However, in my view, the benefit also includes enhanced metaphorical or figurative *“seeing”* of something, missed by most, coupled with *“seeing”* how to use it creatively.

In their book, innovation experts Denning and Dunham (2010) provide a list of 12 innovation sources compiled from many sources. Their innovation inspirations are: unexpected events, incongruities, process need, change of industry structure, demographics, change of mood or perception, new knowledge, patent problems, value maximization, marginal practices, “dying cows,” and new games.

Consider these three examples provided by the authors:

- *Changes of industry structure* is illustrated by Intel, in the early 1980s, *“seeing”* that memory chips would become global commodities and *“seeing”* that the company should put most of their “chips” on processor chips.
- *Patent problems* in the list is likely to recall Genrich Altshuller’s *“seeing”* that patents had patterns and then *“seeing”* a way to develop his Theory for Inventive Problem Solving (TRIZ).
- *New games,* where “games” refers to social systems with well-defined rules, is illustrated by how the personal computer of the early 1980s almost made the mainframe computer obsolete. Contrast that with lack of *“seeing”* by Ken Olsen, founder of Digital Equipment Corporation, who said in 1977 "There is no reason for any individual to have a computer in his home."

In my view, doing visual arts increases the likelihood that we will *“see”* innovation inspirations, like those noted by Denning and Dunham (2010). Visual arts makes us less likely to suffer from “inattentional blindness” and the “illusion of attention” mentioned earlier in this paper.

BENEFIT 2: YOU APPLY COMPOSITION RULES TO IMPROVE COMMUNICATION

Art’s Composition Rules

The word “composer,” or the related word “composition, may prompt us to think of composing music or an essay. However, that’s not the intended meaning here. Instead, we go to the visual arts world where composition refers to how elements or things are positioned on a painting or drawing or arranged within a sculpture or photograph.

The visual artist, intentionally or unintentionally, uses composition rules, based more on experience than theory, to draw us in, set a mood, and send a message. We are not sure why, but the human brain tends to respond favorably to classical composition rules traced back to at least the Renaissance (Calle 1974, Hoddinott 2003, Biasotti Hooper 2016, Krizek 2012).

For example, consider da Vinci’s Mona Lisa (Figure 8). Most of us are drawn to it, probably by the eyes, but maybe the hands. That attraction is the result of art’s Create a Focal Point rule. That and most of art’s other composition rules can also become some of the communication rules for members of many professions and disciplines, as will be illustrated shortly.

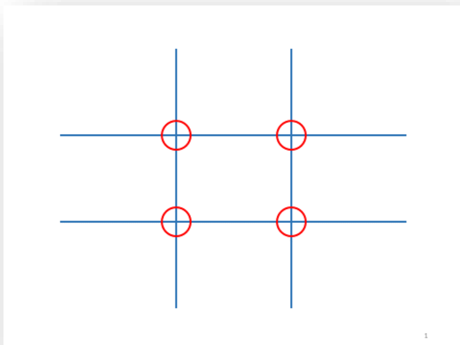
Figure 8: As an illustration of the Create a Focal Point Rule, we are drawn to the Mona Lisa probably by her eyes but maybe her hands. (Source: Pixabay)

While art's composition rules are commonly and frequently applied, they are sometimes ignored. An example is the Mona Lisa (Figure 8), which is centered, at least from a left-right perspective, and thus conflicts with the Rule of Thirds, which is described below. Occasionally circumventing an art rule may be somewhat like, in other professions and disciplines, occasionally ignoring rules of thumb.

After explaining and illustrating some of art's rules of composition, I will show how members of any profession or discipline can apply art's rules to enhance their textual and visual communication. This is, in my view, the second benefit of doing visual arts.

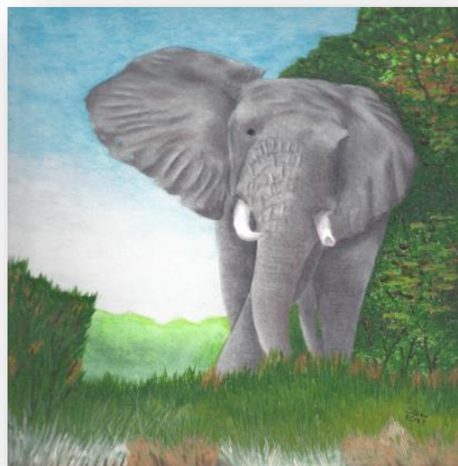
Rule of Thirds: To understand the reason for this rule's name and how artists use the rule in drawing and painting, imagine partitioning the vertical and horizontal spaces of a canvas into thirds, as shown in Figure 9. Note the intersections -- the circles. Visualizing the circles, the artist places the principal object in the general location of one of the circles, to assure that it is off-center.

Figure 9: The Rule of Thirds urges artists to place the principal object off-center. (Source: Author)



We might think that the main object or subject should be in the middle -- in the center of attention. No -- the brain usually prefers having the principal object placed at least slightly off-center, like the pencil and acrylic elephant in Figure 10 (Hoddinott 2003, Biasotti Hooper 2016, Krizek 2012). Exceptions occur, as already noted using the Mona Lisa as an example.

Figure 10: The elephant art work illustrates the Rule of Thirds, Emphasize Positive Over Negative Space, Create a Focal Point, and Favor Odd Over Even. (Source: Author)



Emphasize Positive Over Negative Space: Consider the art composition rule that stresses positive over negative space. Positive space is that occupied by the principal object and negative space is everything else. The elephant in Figure 10 rightly occupies a substantial portion of the piece.

Create a Focal Point: Immediately bring the viewer to the principal object through the use of size, color, or other visual features. Examples are the already-mentioned Mona Lisa smile (Figure 8) and the elephant's white tusks or large ear (Figure 10). They grab the viewer's attention (Hoddinott 2003, Biasotti Hooper 2016, Krizek 2012). Arts editor and author Will Gompertz says "Every painting has a point of entry" -- an observation to consider when designing any kind of visual. Why? We are often competing for the attention of busy people.

Favor Odd Over Even, Especially Three: This rule recognizes that the human brain prefers an odd number of objects over an even number. Of course, we can usually remember three words or items (Biasotti Hooper 2016, Gallo 2014, Whitehouse 2009). Claude Monet's "Three Fishing Boats" (Figure 11) illustrates visual art's "odd over even" rule.

Figure 11: Monet's fishing boats illustrate Favor Odd Over Even, Especially Three. (Source: Pixabay)

Given that the person in Figure 8 and the animal in Figure 10 are the only significant objects in those art works, they satisfy the odd-over-even rule. However, I submit that if we were to consider more people or animals in those pieces, three or five would be preferred over two or four.

We are often exposed to and respond to the "three" version of the odd-over-even rule, but barely notice it. Nine examples:

- 3 pieces of cutlery we use to set a table
- 3 wishes we get from Aladdin's lamp
- 3 inalienable rights in the U.S. Declaration of Independence
- 3 spirits in *A Christmas Carol*
- 3 suggestions in the safety slogan stop, look, and listen
- 3 primary colors -- red, yellow, and blue
- 3 colors in the U.S. flag
- 3 musketeers in Alexandre Dumas' novel of that name
- 3 events in the U.S. thoroughbred racing Triple Crown

Use Color to Evoke or Connect with Emotion

Our brains have evolved to associate specific colors with certain emotions. Therefore, we should select dominant colors for slides, documents, art, and other communication materials that elicit, from our readers or audience, the emotion we want to establish. Or, use color to connect with the known or expected emotion of the reader or audience. An example of the former would be you trying to generate passion for an idea throughout an audience and an example of the latter would be trying to match or reflect your reader's known need for stability.

Table 1 provides color selection guidance recognizing that we must allow for subjectivity when working with colors. Artist Georgia O'Keefe suggested the power of color by saying "I found I could say things with color and shapes that I couldn't say any other way."

Color selection as part of your next communication effort may seem minor, like some of the other composition rules. However, the cumulative effect of applying composition rules can be significant because, as noted at the outset of this paper, vision is the dominant sense. You will more fully understand that positive cumulative effect when you see how your readers or audiences respond. Incidentally, some color combinations do not work well for most viewers -- like red on blue -- so carefully test them.

Table 1: Select colors that will elicit desired emotions or connect with known emotions. (Source: Adapted from Lundberg 2018, Mittelsteadt 2011, and Raskin 2002)

Black	elegance, sophistication, intimidation, power
Blue	trust, authority, security, serenity, intelligence
Brown	security, stability, wholesomeness, honesty, warmth
Gray	professionalism, formality, conventionality
Green	money, growth, environment, harmony
Orange	movement, construction, energy
Pink	femininity, calm, romance
Purple	royalty, spirituality, luxury, mystery
Red	power, aggression, activity, rescue, passion
White	cleanliness, class, innocence, purity
Yellow	light, nostalgia, future, philosophy, happiness, hope

Applying Visual Art's Composition Rules to Enhance Communication in the Business and Professional World

Recall my suggestion, in the Purpose section at the beginning of this paper, that doing a visual art is a way for almost anyone, whether a student or practitioner, to enhance his or her creative and communication knowledge, skills, and attitudes. And that includes the composition part of doing art.

So, what is the benefit of a rudimentary understanding the art world's composition rules? The short answer, as already suggested, is that scientists, engineers, and members of many other disciplines are composers of various kinds of communication -- writing, speaking, and imaging. Therefore, they should ask what kinds of text, images, props, and other aids will be preferred by the brains of the colleagues, clients, owners, and stakeholders they work with or serve? We want to grab their attention, hold their interest, and share our message -- just like artists do. And, just like artists, we should apply rules of composition.

Designing Presentation Slides: Too many presentation slides use the format illustrated in Figure 12 -- a statement followed by several to many lines of text each preceded by a bullet. In light of what we just said about the importance of composition and, earlier, about vision as the dominant sense, why do we make lots of text-only, or mostly text, slides?

Figure 12: Too many slides use the weak bulleted list format. (Source: Author)

Consider these possible reasons:

- Templates included in PowerPoint and other slideware products encourage and enable us to very efficiently create ineffective text-only, bulleted slides
- We think the simple text format is helpful, especially for us as speakers, because it provides notes to guide us as we speak
- We can easily generate text while finding appropriate images requires more effort

Research indicates that the slides produced by the preceding reasoning are not effective. Audience members are confused by word inconsistency because they see one set of words on the screen and hear another set, as the speaker, paraphrases the slide. Or, worse yet, the speaker reads the slide to the audience which raises this question: Why is the speaker needed?

Fortunately, research has solved the slide problem by revealing that the most effective slide contains a declarative statement with a supporting image. Figure 1 in this paper uses this assertion-evidence format. Audience members tend to learn better and retain more from words and images than from words alone (Alley 2019, Atkinson 2010, Gallo 2014, Garner and Alley 2013, Reynolds 2008).

The assertion-evidence approach also benefits the presenter. Garner et al. (2016) concluded that "presenters using an assertion-evidence approach think more deeply about the content during the preparation of the slides than presenters following the typical approach."

Caveat: While advocating the assertion-evidence approach, I am not arguing that all slide should use it. Other formats, including the heavily used bulleted list, will sometimes be more effective.

If you are receptive to the assertion-evidence format, consider other ways in which art's composition rules can enliven some of your slides. Figure 1 provides examples. The eye is slightly off-center (rule of thirds), the eye dominates (bold positive space and a focal point), and trustworthy blue appears throughout the image (color effects emotion).

When preparing your next presentation, use one or more composition rules on most of your slides to strengthen communication. Recognize that you will still need some text-heavy slides, table slides, and graph slides, and others, but some of your slides can use the assertion-evidence format plus be compositionally effective and, as a result, enliven your presentation.

Arranging Text: Individuals in various professions and specialties routinely produce text-heavy documents such as emails, memoranda, letters, proposals, reports, executive summaries, and articles and papers intended for publication. Integrate some of the art world's composition rules into the planning and drafting of your documents. Three examples:

- Executive summary -- Keep it short, out of consideration for the busy reader. Also, to attract and engage the reader, apply the odd over even rule by breaking the summary into *three* sections each with a header. For example, use Purpose, Findings, and Recommendations.
- Article or professional paper -- Besides using composition rules while preparing slides or other visuals, apply the odd or even rule by structuring the main points of your document in the form of *three*, or maybe *five*, principal findings, conclusions, recommendations, benefits, or other essential aspects of your message. This paper illustrates that recommendation by stressing *three* major benefits of doing visual arts.
- Proposal to provide services or conduct research -- Describe your organization's *three* strengths or the *five* steps you would take to produce a successful project.

To reiterate, any single use of art's composition rules when arranging text, may seem minor, if not trivial. However, the cumulative effect is likely to attract and retain the reader and, as a result, help convey your message. That's why artists attend to composition -- let's learn from their success.

BENEFIT 3: YOU USE THINKING METHODS, BASED ON BASIC BRAIN LITERACY, TO BE MORE CREATIVE

Doing a Visual Art Can Increase Knowledge of Brain Basics

My Visual Art to Brain Basics Experience: A decade ago, after an over five-decade lapse that began after the third grade, I returned, on a whim, to art by taking a graphite pencil drawing class, enjoying it, going to many more classes, and doing a variety of drawings. I soon moved to colored pencils and acrylic and discovered that I would work for two or more hours while being oblivious to the passage of time. In returning to art, I initially envisioned no connection to engineering education or practice. This was simply a pleasant diversion.

However, in addition to creating pieces that I never envisioned, this return to art had another creative effect. As a result of thinking about and doing art and talking to my art instructors and other students, I began to see potential connections between doing visual arts and improving education and practice within engineering and probably beyond.

I was referred to and read Betty Edward's book *Drawing on the Right Side of the Brain* (Edwards 1999). That led to studying the literature, including neurological discoveries; interacting with colleagues; writing articles; presenting papers; conducting workshops; and writing the book *Introduction to Creativity and Innovation for Engineers* (Walesh 2017). One step in a new direction can lead to many more and new and valuable discoveries.

My entry, on a whim, into a visual art enabled me to produce some satisfying pieces, learn about the human brain, and use that knowledge to help engineers and others be even more creative. My studies and experience convince me that basic brain literacy will empower essentially anyone to live and work smarter, including being even more creative.

***Genrich Altshuller's Brain Views*:** Discussing the human brain may remind us of Genrich Altshuller's (1999) related views. He makes surprisingly few explicit comments about the brain (the organ) and the mind (how we use the organ) and, when he does, he offers mostly words of caution. For example, he wrote "During the process of evolution, our brain learns to find approximate solutions to simple problems. However, it does not develop mechanisms for slow and precise solutions to complex problems." Altshuller suggests that the mind leans to quick and suboptimal solutions.

He also offers this thought: "This instrument is unique -- the human mind. With the correct organization of creative work there is maximization of the stronger elements of human thought processes like intuition and imagination. However, the weaker sides of the thought process -- such as inertia -- must be considered." Then, much more optimistically, and with some humor, Altshuller stated "The world is endless, the universe inexhaustible, and the human mind will never be threatened with unemployment."

In summary, Genrich Altshuller seemed to believe that making casual use of our brains in solving problems will lead to less than creative solutions. However, if we maximize the brain's stronger elements, we will discover creative and satisfying solutions.

I concur and that is why I advocate, in this discussion of the third benefit of doing visual arts, acquiring basic brain knowledge and applying related whole-brain or creative thinking methods to solve technical and non-technical challenges. Don't take your brain for granted, which is easy to do, because it goes wherever we go and part of it, your subconscious mind, functions largely without your knowledge.

Your Potential Visual Arts Experience: If you venture outside of your comfort zone, especially as a newcomer in a visual art, you may find the artist within -- you may enjoy eye-opening, satisfying, and brain-revealing experiences. However, you have to start the process to open up those possibilities. You only go around once, as they say, so make it a great trip. Think of an iceberg. At any point in our lives, you or I see ourselves in a particular way. But, contemplation reveals that view is just the tip of our iceberg of possibilities. We each have great untapped potential.

Maybe, in addition to or part of your current professional role, you could also be an artist, or an author, musician, inventor, speaker, leader, politician, … You won't know unless you explore some possibilities, as explained by author Charles Handy (1998), who said: "We only really find ourselves when we lose ourselves in something beyond ourselves." The visual arts can do that.

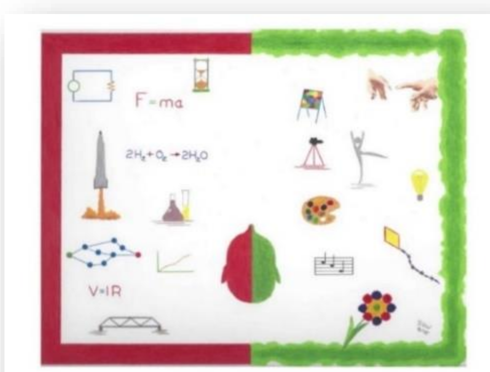
Brain Basics and How They Can Help Us be More Creative

Doing art serendipitously led me to acquire brain literacy and, in turn, find ways to use brain basics to be more creative. Whether or not doing a visual art led you to some form of improved brain literacy, or may do so, be open to the idea that improved brain literacy is the key to opening the door to more creativity.

Brain literacy means "Neuroscience 101" -- not neurosurgery knowledge. This is practical and immediately applicable "stuff" that capitalizes on the combination of what science and the medical profession have learned in recent decades. The brain is an instrument and "playing" it effectively to enhance creativity requires an understanding of how it works at the most basic level. Consider some brain basics and how they can help you be more creative. Out of necessity, including this paper's scope, the following discussion is at most a very brief introduction based on Walesh (2017) and invites further study by the interested reader.

Left and Right Brain and Conscious and Subconscious Mind: As suggested by Figure 13, the brain's left hemisphere is verbal, logical, temporal, and symbolic contrasted with the right hemisphere which is nonverbal, intuitive, non-temporal, and actual or real.

Figure 13: Creative thinking includes effectively using both of the brain's very different hemispheres. (Source: Author)



The marked ability differences between the two hemispheres suggests the wisdom of trying to engage both of them when faced with a challenge, especially if creativity is valued.

The conscious mind processes thinking that we are aware of and the subconscious mind processes thinking that we are not aware of. Almost all of our cognitive processing is done subconsciously, which suggests doing what we can to use our conscious mind to further engage our subconscious mind. Instead of relying on our conscious mind as the origin of creative ideas, use it mostly to thoroughly define challenges. That priming of the subconscious mind, combined with patience and persistence, will cause the subconscious mind to become a fountain of creative solutions.

Although he does not use the term, Genrich Altshuller referred to the potentially powerful role of the subconscious mind. He wrote: "It was noticed long ago that many inventions were made in three steps. First, an inventor intensely and unsuccessfully searches for a solution. Then, having not solved the problem, he stops thinking about it. Some time passes, and suddenly, as if a delayed-action mechanism goes off…the required solution appears" (Altshuller 1999).

If we understand how our brain works -- again, basic brain literacy -- and use readily available related methods, as discussed below, we don't have to rely on accidental "ah-ha!" moments. We can make them happen.

Habits: We are on automatic pilot at least half the time in that our involuntary actions -- our habits -- dominate what we think, say, and do. Habits can be "good" or "bad" with both kinds sneaking up and capturing us. Some habits are conducive to creativity such as curiosity, openness, persistence, and thoroughness. Others, such as opposites of the preceding, frustrate creativity.

Habits are directed by our subconscious mind and work like this: We see or experience a *cue*, such as feeling thirsty. We initiate a *routine*, such as buying a soft drink. We receive a *result*, such as feeling good -- which may or not be good for us.

Replacing a bad habit with a good habit is easy to understand, but hard to do. Replacement requires that our conscious mind recognizes the *cue*, initiates a new preferred *routine*, and obtains a desirable *result*. This cycle must be successfully repeated many times until the subconscious mind learns the desirable habit. Habit change requires great self-discipline. However, and for example, if someone wants to be more creative and has the "bad" habit of jumping to conclusions, that habit-change effort may yield very useful results (Walesh 2017).

Negativity Bias: Our ancestors lived in a harsh environment, whether on the largely open savanna or the densely-vegetated jungle. These hunter-gatherers frequently faced the threats of predation and starvation. On any given day, they knew they could be "eating lunch" or "be lunch." Their harsh environment caused them to focus on possible negative outcomes. Negativity bias, although not needed anywhere near the extent to which our ancestors needed it, is still with us today. It is in our brain and is not our fault (Walesh 2017).

If we allow negativity bias to prevail, we will be less likely to seek, suggest, advocate, prototype, test, and implement creative ideas. “The greatest mistake you can make in life,” according to writer Elbert Hubbard, “is to continually fear you will make one.” The cumulative effect of untethered negativity bias may be late-life regrets -- including unfulfilled creativity visions.

Forewarned is forearmed so don’t immediately respond, in knee-jerk fashion, to novel ideas. Instead, consider them, perhaps using whole-brain methods discussed in the next section, to stimulate possibility thinking. After all, as noted by Alex Osborn, creator of brainstorming “It is a lot easier to tame a wild idea than to invigorate one that has no life to begin with” (Hurson 2018).

Creative-thinking Methods and Their Neuroscience Bases: Fortunately, many methods are available to help us engage our left and right hemispheres, connect our conscious and subconscious minds, and draw on other brain knowledge when we want to thoroughly define a challenge and then seek a creative solution. Because they use brain literacy, we can also call these tools whole-brain methods. While the list of potential methods is essentially unlimited, I have discovered and used 20 which are listed in Table 2. My book (Walesh 2017) explains the neuroscience connection of each method.

Table 2: Creative-thinking or whole-brain methods. (Source: Walesh 2017)

1) Ask-Ask-Ask	11) What
2) Borrowing Brilliance	12) Biomimicry
3) Brainstorming	13) Challenges and Ideas Meetings
4) Fishbone Diagramming	14) Freehand Drawing
5) Medici Effect	15) Music
6) Mind Mapping	16) Process Diagramming
7) Ohno Circle	17) Six Thinking Caps
8) Stream of Consciousness Writing	18) Supportive Culture-Environment
9) SWOT	19) TRIZ
10) Take a Break	20) Taking Time to Think

I offer a short list of 20 methods to first suggest, in a tip-of-the-iceberg manner, the large number of varied tools available. Second, I encourage individual and team use of varied creative thinking or whole-brain methods -- not necessarily drawn from my 20 -- when faced with a challenge to avoid design fixation (also called reproductive thinking and Einstellung Effect, Walesh 2018).

Searching for, using, and evaluating creative-thinking or whole-brain methods connects with Genrich Altshuller’s views. He disparaged trial and error and urged us to “look for a better way to solve technical problems” (Altshuller 1996). After all, “Trying harder is a prescription for disappointment and dissatisfaction…trying differently… changes everything” (Cooper 2006).

On seeing a list of 20 creative-thinking tools, one of which is TRIZ, you may suppose that all are intended to be on the same plain. They are not -- they occupy different plateaus with TRIZ being on the highest one.

Consider, for example, the efforts expended in developing the listed methods. They varying widely and none match Genrich Altshuller's persistent, thorough, and very original patent-studying effort in producing TRIZ. As noted by the Altshuller Institute, "TRIZ is unique in that it was developed from empirical data -- patent research."

In my view, the other 19 listed thinking methods can be selectively used to complement TRIZ. Altshuller advocated having many methods available for possible use when solving problems. For example, while discussing the problem-definition part of his algorithm, he said: "Most often, an inventor applies two or three well-mastered procedures… The methodology of inventing…increases one's arsenal by including dozens of procedures for creating an altogether rational system for solving inventive problems" (Altshuller 1999). Tools like those on the list offer a better way, that is, methods that move us beyond trial and error and toward a more systematic and rational approach.

Altshuller (1996) also said "To solve an inventive problem it is not as important to have so much knowledge as it is to organize the knowledge that one already has. Many of the Table 2 creative-thinking methods do just that with some examples being Fishbone Diagramming, Mind Mapping, Ohno Circle, SWOT, Freehand Drawing, Process Diagramming, and Taking Time to Think.

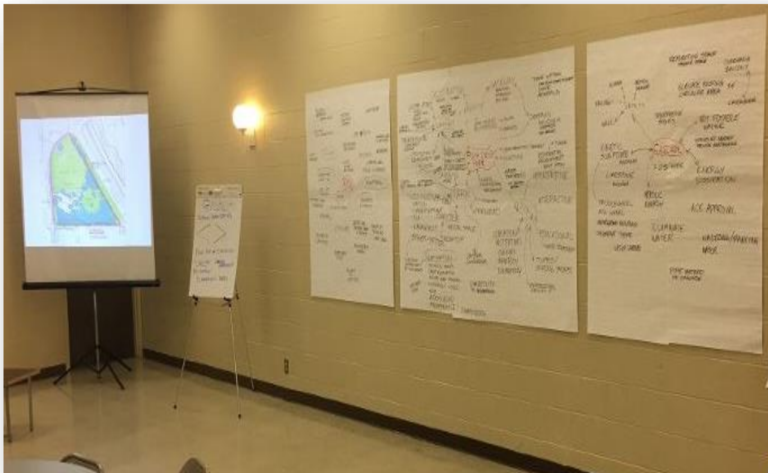
To the extent that these methods help to organize already available knowledge, they can be used to supplement the application of TRIZ, especially defining the problem to be solved. Asked what he would do if given one hour to save the world, Albert Einstein said, "I would spend fifty-five minutes defining the problem and only five minutes finding the solution" (Honore 2013).

Example Use of Mind Mapping -- Pumping Station in Park: Evansville, IN was faced with the challenge of designing and constructing a 40 mgd treated sewage pumping station in the middle of the City's favorite park. How could they reconcile the potential or perceived functional conflicts between operation of a large wastewater pumping station and active and passive recreation enjoyed by large numbers of people of all ages?

To begin to answer that question, a highly varied group of 30 consultants and City personnel actively participated in a facilitated two-hour mind mapping session (Walesh 2017). This simple, highly visual, and radial interaction technique typically generates many, varied, and unexpected issues and ideas.

In this case, the goal was to broadly and deeply define the conflicting situation with the hope of beginning to find a solution. The result, as suggested by the mind maps shown in Figure 14, was 110 highly varied issues and ideas. Mind mapping results were subsequently mixed, matched, expanded, deleted, and eventually used in design.

Figure 14: Mind Mapping identified issues and ideas which stimulated the design of a combination pumping station and recreation-education building. (Source: Author)



One result: A large two-story building with a basement, shown in Figure 15, combining a 40 mgd sewage pumping station and attractive multipurpose -- recreation, social, and education -- spaces and facilities. Construction of the unique facilities began in early 2018 and will feature the structure in the midst of a dramatically improved and enlarged river-front park (Landers 2019).

Figure 15: Construction of the combination pumping station and recreation-education building began in early 2018. (Source: Donohue & Associates)

Example Use of What If? -- Panama Canal: In the late 19th century the French tried, but failed, to construct a sea-level, interoceanic canal across the Isthmus of Panama. The U.S. purchased the assets of the French canal company and started work on a sea level canal in 1903. The sea-level approach was soon abandoned in favor of building a dam on the Chagres River to create a lake, now called Gatun Lake, on the isthmus. The lake and canal would be connected to the Pacific Ocean by one series of locks and to the Caribbean Sea by another series of locks.

The Panama Canal project was facing many challenges when Engineer John Stevens took over its leadership in 1905, bringing with him many engineering achievements, especially in railroading. One challenge was how to excavate and haul rock and earth.

While his French and American predecessors saw the project as an excavation project, he in a What If? manner, viewed it as a railroad project. While excavating was a challenge, hauling the excavated rock and earth to either coast or to wherever fill was needed, such as the site of the dam that would form the lake, was a much bigger challenge.

Stevens instituted what was known as the Railroad Era where his objective was "to create a system of dirt trains that would function like a colossal conveyor belt, rolling endlessly beside steam shovels working at several levels at once" (McCullough 1977). Doing this required the creation of a track-mounted machine that could quickly pick up and move a section of rail, with ties attached, so that rail cars could always be close to the excavating machines. The construction continued with the canal opening quietly in 1914 (McCullough 1977, Walesh 2017).

Example Use of Biomimicry -- High Speed Trains: Natural sciences writer Janine M. Benyus, in her book *Biomimicry: Innovation Inspired by Nature,* defines biomimicry as "a new science that studies nature's models and then imitates or takes inspiration from these designs and processes to solve human problems…" (Benyus 1997).

Altshuller (1999) uses the term bionics and Bar-Cohen (2012) uses biomimetics and both offer many examples. The name aside, nature becomes a source of ideas, a creativity teacher. The following bird-beak-to-fast-train story nicely introduces biomimicry.

Japan's high-speed trains have been known from their beginning for their safety, efficiency, and comfort. However, until the late 1990s, they were also noted negatively, on one line, for the loud noise they made on exiting that line's many tunnels. "When a train entered a tunnel, its blunt bullet-shaped nose compressed the air. When the train exited the tunnel, the compressed air expanded so rapidly it produced what was known as a "tunnel boom" -- a loud disruptive noise (Vanderbilt 2012).

Eiji Nakatsu, Chief Engineer of the West Japan Railway Corporation needed to solve the tunnel boom problem. He was familiar with birds -- his hobby was studying them. Nakatsu and his engineers experimented by firing various shaped bullets, inspired by bird beak shapes, into a pipe until they found the shape that caused the least tunnel boom. The long tapering beak of the Kingfisher (Figure 16), a bird that dives quickly and quietly into water to catch fish, was found to be the shape that caused the least exit noise.

Figure 16: The shape of the Kingfisher's beak lead to the solution of the tunnel boom problem. (Source: Pixabay)

The new Kingfisher beak-shaped Shinkansen trains (Figure 17) went into service in 1997 (Vanderbilt 2012, EarthSky 2012). Problem solved by looking to nature.

Figure 17: The much quieter Japanese Shinkansen train. (Source: Pixabay)

DOING VISUAL ARTS CORRELATES WITH GREATEST SCIENTIFIC SUCCESS

In advancing its purpose of encouraging doing visual arts because that will enhance communication and creativity knowledge, skills, and attitudes, this paper has been comprehensive as to professions and specialties. This section makes an exception by focusing on science. Why? Because the comprehensive study of avocation-vocation in science described here is likely to have implications for related fields such as engineering, technology, and beyond.

To test the hypothesis that "arts and crafts avocations" were correlated with the success of scientists (and to some extent engineers), a team of researchers exhaustively studied "autobiographies, biographies, and obituary notices of Nobel Prize winners in the sciences, members of the [British] Royal Society, and the U.S. National Academy of Sciences" and "adult arts and crafts avocations" were tabulated. As an example of the study's thoroughness, it included all Nobel laureates from 1901 through 2005.

Individuals were credited for arts and crafts avocations only if evidence indicated doing, not just studying, arts or crafts. Researchers also used data from a "1936 avocation survey of Sigma Xi members [honor society for scientists and engineers] and a 1982 survey of arts avocations among the U.S. public" (Root-Bernstein et al. 2008).

The research result most relevant to this paper, and consistent with and extended previous studies extending back to the early 20th Century, is: Nobel laureates were about three times as likely to do arts and crafts -- essentially equivalent to visual arts as used in this paper -- as were Sigma Xi members and the U.S. public.

How to explain the correlation between being a Nobel Laureate and doing visual arts? According to the authors, the most successful scientists chose avocations functionally connected to their vocations.

The described study focused on scientists, as indicated by the organizations used to provide data. However, given the overlap in the formal educations of scientists and engineers/technologists and the fact that engineering and technology build on a science foundation, some of the research results are likely to apply to the engineering/technology vocations.

SUMMARY: BENEFITS AND JOYS

This paper's title asks: Can doing art make you even more communicative and creative? I say "yes," based on these three benefits described in the paper:

- You use enhanced vision, literally and metaphorically, to be more creative
- You apply composition rules to improve communication
- You use thinking methods, based on basic brain literacy, to be more creative

In closing, please recognize that just as we do some of our engineering, science, or other work for the fun of it, artists do some of their art for pleasure. For me, hours fly by as I enjoyably create images with pencils and paint. If you are not engaging in visual arts, consider exploring it. You may find a new joy -- and enhanced work capability.

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His principal professional activity is studying, writing, speaking, and teaching about how to use recently discovered basic brain knowledge, coupled with creative-thinking (whole-brain) methods, to help individuals and their organizations work smarter, that is, be more effective, communicative, and creative.

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