

Art-Science Connections: An Investigation of Creative Innovation

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ABSTRACT

Most people would probably describe art and science as polar opposites. This is understandable, as their applications today frequently serve contrasting purposes. Often, though, it is not realized that the histories of art and science are remarkably parallel, even in the twentieth century. The purpose of this investigation is to reveal this parallelism and show that art and science are strongly connected. It is hoped that this realization will encourage collaboration between these disciplines and, in turn, broaden horizons.

INTRODUCTION

Any discussion of art and science ought to include the work of a man who is not only revered as a great artist, but also revered as a remarkable inventor and engineer: Leonardo da Vinci. He painted beautiful portraits such as the Mona Lisa as well as sketched ideas for automobiles, helicopters, and machine guns centuries before their times. He is often referred to as a “man of both worlds”, but it is doubtful that he thought of himself as a juggler of two opposing disciplines. Da Vinci lived during the Renaissance, a time when art and science were not yet distinguished as separate. Today there exist long-time, ingrained biases against fraternization between the fields of art and science; they are commonly described as occupying opposite ends of a broad spectrum with stereotypical, “nerdy” scientists in white lab coats on one end and stereotypical, passionate, starving artists on the other.

During my undergraduate career, I developed a hunch that art and science are not really as different as they may seem. This hunch stemmed from my experiences in attempting to remain involved in both the arts and the sciences while attending college. Despite success in both biology and music classes, there always seemed to be people on either side, both students and faculty, who did not take me entirely seriously because of my involvement with the “other side.” It has been said that “a prejudice exists in America, that specialists ought not trespass beyond their own paddocks, however interestedly they may



Figure 1. Christ in Majesty, detail of apse painting from the Church of San Clemente, Tahull, Lerida, Spain, 1123. Illustration from *Art History*; Harry N. Abrams, Inc., 1995

look over the rails.” (Zinsser, p.11) This is a statement that resonates with my experience. Art and science are two of my favorite things, and, because I have never felt that I must lead a double life in order to enjoy them both, I believed that there must be a connection between them--hence the inspiration for this investigation.

BACKGROUND

Before I could begin, historical research on the developments of art and science was necessary to provide the background crucial to understanding the connections that exist today. Early on, it became evident that the developments of art and science over time have been remarkably parallel, even in the twentieth century. Explanation, though, begins with the medieval period. People living in medieval times saw the world in a very different light than most people do today. God and the church were the only things that really mattered, and everyday objects and observations of nature were viewed as meaningless and illusionary. Science was non-existent, and art was intended only to focus thoughts on God and worship. Faces were drawn or painted without expression and music was written without rhythm or harmony. (Figure 1)

With the coming of the Renaissance, perceptions began to change. As the church lost its power and loosened its grip, people began to feel free to observe their environments. During this time came the discovery of linear perspective, a drawing technique which uses geometrical principles to promote the illusion of depth. Artists learned that the world around them could be measured, quantified, and drawn with exacting precision. Interestingly, it was during the same time period that Theodorich of Freiburg performed one of the first scientific experiments in history in which he employed the same geometric principles used by these artists to understand and describe how rainbows form. (Figure 2)

As it became more acceptable to observe the world for what it really was, people who are often referred to today as the forefathers of science, Galileo and Copernicus for example, began making startling discoveries. It is obvious, though, in a painting depicting the

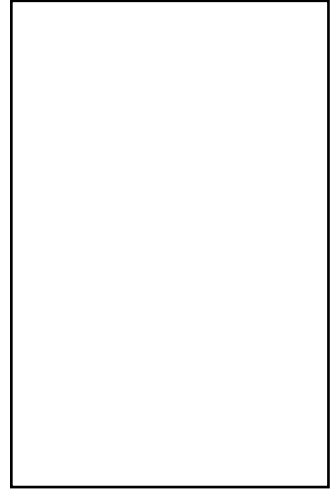


Figure 2. One of Theodorich of Freiburg's sketches showing how the rainbow was formed, early 14th century. Illustration from *The Day the Universe Changed*; Little, Brown and Company, 1985



Figure 3. Brahe's compromise with Copernicanism, late 16th century. Illustration from *The Day the Universe Changed*; Little, Brown and Company, 1985

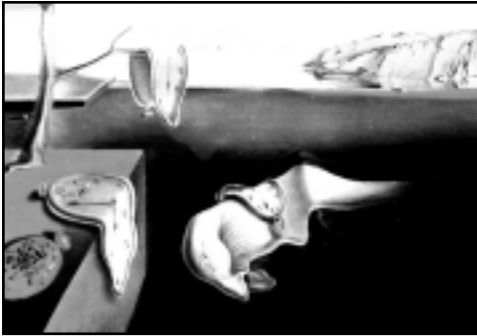


Figure 4. *The Persistence of Memory*, Salvador Dalí, middle 20th century. Illustration from *The Illustrated History of Art*; The Apple Press, 1992



Figure 5. *Nude Descending a Staircase*, Marcel Duchamp, early 20th century. Illustration from *The Illustrated History of Art*; The Apple Press, 1992

Copernican universe (Figure 3), that art and science were still much more integrated in the late sixteenth century than they are currently.

After the Renaissance, with the definition of the scientific method, art and science split into separate disciplines, but a strong parallelism in their developments remained and is still apparent in the twentieth century. One of the most striking and most often written about parallelisms exists between modern physics and modern art. The ideas that we live in a world in which perspective is transitory, time changes and warps, and inanimate objects can

change shape are present in the science and the art of the twentieth century. They are obvious in quantum physics, as in the work of Albert Einstein, as well as in modern art, especially cubism, like that of Pablo Picasso and Salvador Dalí. Despite their involvement in seemingly very different professions, all were interested in multiple perspectives, alternate dimensions, and the bending of time. These ideas are clearly portrayed in *The Persistence of Memory* by Salvador Dalí (Figure 4) and in a cubist painting, *Nude Descending a Staircase* (Figure 5), where a singular human form is painted from several different perspectives in space and through several moments in time—all on the same canvas.

THE INVESTIGATION

After gaining a solid historical base from which to begin my investigation, I turned to my original proposal written in March of 1998. My hypothesis read, "I propose to explore my personal belief that science, in its purest sense, in its essence, is art." I intended to interview UW-L art and science faculty in order to gain their insight into the connections that exist between art and science today. Thus, I developed a questionnaire (Table 1) and sent it to prospective interviewees. I interviewed the faculty members who expressed an interest in the project and reviewed the tapes with the

intent of finding similar quotes from artists and scientists that could be paired and used in the final dissemination of the project. I anticipated that artists and scientists would make similar comments to questions posed during the interview, demonstrating that their creative processes are more alike than they may seem.

Table 1. Sample Interview Questions

- How do you feel about the image of the stereotypical artist/scientist?
- Do you feel you have artistic or scientific attributes? If so, what?
- What serves as the motivation for your work?
- Do you feel there are connections between art and science?
- How do you feel at a project's completion?
- What is it that makes an artist or scientist an exceptional one?

After my initial interviews, it was obvious that my investigation would change its course. It was only after I began talking in depth with faculty about my project that I realized how vague my original hypothesis was. Also, after repeatedly being asked, "What do you mean by science?" and "What do you mean by art?" I realized that I would have to develop definitions of art and science. Unfortunately, the following definitions from Webster's dictionary seemed little more than descriptions of stereotypes of art and science and seemed, at the very least, incomplete: art n. 1.a. The activity of using imagination and skill to create beautiful things. b. Works, as paintings, that result from this creativity. 2. A field or category of artistic activity, as literature, music, or ballet. 3. A nonscientific branch of learning, esp. one of the humanities. 4. A trade or craft and the methods employed in it. 5. A practical skill: knack. 6. The quality of being cunning; artfulness. science n. 1. The study and theoretic explanation of natural phenomena. 2. A systematic activity requiring study and method. 3. Knowledge, esp. that acquired through experience.

Each time I felt I had developed better definitions, I read something, or an interviewee said something that made them seem incomplete as well. Although I originally thought definitions would be a necessary part of the foundation for this investigation, they were, surprisingly, developed as part of the conclusion.

Another problem I had was finding quotes from artists and scientists that could be paired (see above) in a way that made sense. The questionnaire worked only as a guideline for the interviews, which didn't follow a strict question-answer format. As a result, each interviewee had his or her own tangent to share. Although I was able to find a few quotes that could be paired, the replies to the questions, for the most part, varied greatly, leaving little with which to construct a final product.

CONCLUSIONS

Although my original idea for the dissemination of this project didn't work, some very interesting insights into the similarities and connections between art and science were gained in the process. The first of these was that it seems artists and scientists have even stronger stereotypes of each other than the general public has of them. Even though each faculty member had received a fairly long explanation of my project and knew that I was looking for connections between the two disciplines, most commented most on the stereotypes of one another. In one interview, for example, one artist said he was quite sure that a scientist's lab could not possibly be so messy and disorganized as his own because a scientist is always engaged in analytical thinking. A scientist made his stereotype of an artist very clear when he said, "it seems like they don't hardly have to work... their work is like their hobby." It seems possible that a reason for the boundaries between art and science and the lack of collaboration between artists and scientists may be the skewed perceptions they have of one another.

Another similarity I noticed between the artists and scientists was in the way they described when and where they come up with their most creative ideas or do their most creative work. Most interviewees did not describe a place or time of day as I had expected, but rather a type of emotional and mental state. Both artists and scientists described a similar state in which they were withdrawn into themselves and where they were highly relaxed and not distracted. One of the artists called it “the zone.” None of the other interviewees used this term, but the states of mind they described were quite similar. Most, especially the scientists, said they could rarely get into “the zone” while at work because of a hectic environment or a focus on teaching. They mentioned activities like taking a walk or run, driving on long trips, falling asleep or waking up, or vacationing. Whether scientist or artist, “the zone” seemed to be a necessary factor in the creative process.

A third similarity between artists and scientists came from their responses to question (6): “What is it that you think makes an artist or scientist a truly exceptional one?” Almost every interviewee mentioned at least one of two things, though they did it with different words and analogies. The first was that it takes an internal drive and a strong sense of commitment to something, especially when feeling very little inspiration, to be truly great. In other words, it is the artist who goes to the studio every day to work on brush strokes or to practice scales, even though he or she isn’t seeing any improvement. It is the scientist who works in the lab every day, despite poor results or ineffective methods. Second, interviewees felt that truly exceptional artists and scientists seem to have the ability to see things in a different way than the others in their fields and possess the ability to gain inspiration from something other than someone else’s work. For example, it is Kekulé, the chemist who discovered the structure of benzene while dreaming of a snake biting its own tail, or Picasso, the painter who drew human forms in ways that no one else had ever imagined before.

Until just a few weeks before the end of this project, I thought these similarities would be what I used to support my thesis, that art and science are strongly connected. A final interviewee, though, reminded me of the importance of developing a strong and all encompassing definition of art and science. He then gave me his idea for a definition that both confirmed my original hunch and contradicted my original hypothesis, that art and science are essentially the same. He said that there is “art” and there is “science” in the disciplines of both art and science. “Science” can be thought of as the mastery of concepts and skills; it is what stems from a strong sense of commitment during times of little inspiration. Science is learning the rules, techniques, and methods of the activity a person is engaged in. “Art,” on the other hand, happens after mastery of the science. It manifests itself when a person inserts his or her own creative will into the process, or “breaks the rules” in some way, allowing one to exceed normal limitations. Art occurs when a person realizes that he can indeed bend rules in order to see things in a different light. Often, this may follow one’s entry into “the zone” which facilitates the creation of new, unique ideas. Art isn’t science or vice versa. Art transcends science. When looking at art and science in this way, it is easy to understand that all scientists are not artists. From this perspective, it would even be acceptable, albeit ironic, to state that not all artists are necessarily artists themselves.

There is one important question that remains. What is the significance of this research topic? I think the answer to this question lies in the reason for my initial interest in this project: because I find both to be an integral part of human nature. I think that both art and science help us to understand ourselves and the world around us. I think they help us to make more sense of our existence. Both science and art are based on a fundamental, human awe

for nature and desire to question. Einstein may have said it best when he wrote, "At their best, both physics and art offer a deeper understanding of reality. Both appeal to a desire for order and insight; they draw together human experiences in the hopes of making sense of reality."

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