Consciousness Reframed III

The Gift of Seeing: Views From the Field

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The nineteenth century writer Emile Zola once remarked “The gift of seeing is rarer than the gift of creating.” This is an intriguing thought today, particularly when we consider that contemporary artists often present work that would have been impossible to conceptualize in the 19th century, when this painting was conceived.

Sometimes the differences between work today and work of the 19th century are strikingly apparent, as is the case in Tony Oursler’s video projections where time and space are manipulated in ways unknown at that time. Sometimes the differences are less obvious. For example, the physician and photographer David Teplica crafted a homage to Michelangelo in 1988. In this photograph Teplica uses radiographs to make it appear that he simply x-rayed Michelangelo’s image of God touching Adam to capture what lies beneath the surface of the painting as we know it.

This allusion to Michelangelo’s ‘Creation of Man’ is particularly compelling because it allows the image to address us on so many levels. For example, X-rays were discovered in 1896, ten years after Zola’s famous painting of Manet, a quite radical artist of his time whom Zola defended. Therefore, the idea that we could find a means to non-invasively see through the opaque surface of the skin without death or incision would have only had a symbolic meaning, or been seen as a metaphor to Manet’s, Zola’s and their peers. At that time the concept did not exist as an actual possibility. Of course, both photography and the x-ray would have been foreign to Michelangelo as well. This perhaps explains why comparing the Teplica and Michelangelo presentations exposes us to the fact that the two artists assume strikingly different vantage points when they divide visible and invisible domains as God touches Adam.

This difference would be even more perceptible to us, as viewers, if we were we to actually look at an x-ray of Michelangelo’s image. X-rays of Michelangelo’s under-painting would not expose what Teplica presents to us, but, instead, how Michelangelo prepared and approached the painted surface we see.

In summary, the photograph alludes to the degree to which we have stretched our scientific, artistic, and technological boundaries. Moreover, and what makes Teplica’s image so powerful, at least to me, is that when Teplica draws on the newer technologies, he presents his homage in a convincing, quite believable, and a visually captivating way.

> Clearly, contemporary artists and contemporary scientists have altered our perceptions of the world we know, acknowledged how our view of the world has changed, and have radically transformed how we see in general. Oursler and Teplica are among the many who have demonstrate that contemporary artists have exploited innovative advances in science and technology — and have stretched the boundaries of art as a result. Of course, new media and new modes of presentation have always stimulated a larger

discourse on art and in art. As a result, visual art remains as difficult to characterize today as it was in earlier times.

As you reflect on this idea, please keep in mind that empirical, scientific work — like art — frequently revises our understanding of seeing, our grasp of what visual perception is, our understanding of what we see, and human creativity in general. What I find enticing about this is that science and technology can expand our understanding of art practices, even when studies are not driven by artistic goals per se. Integrating these advances with art practices, as a result, broadens our understanding of how imaginative and concrete approaches operate across disciplinary domains. The two case studies I will speak about in my talk today represent an effort to expose some under-investigated aspects of the art, science, and technology exchange.

Earlier in this discussion I used the term 'the gift of seeing' to convey how difficult it is — and has been historically — to define visual communication. The two scientific investigations I will now introduce will serve to illustrate how technological advance often re-arranges how we perceive our questions and how innovative practices in art and science use technology to stretch our boundaries. The first study explores the relationship between photography and early vision science. Secondly, I show how a colorblind artist has illuminated understanding of vision, art, and brain functions.

Visual Science

Vision science as known today began to take form in 1838, when Sir Charles Wheatstone (1802-1875) provided the empirical grounds for rejecting the then prevalent notions of binocular combination, or how we see naturally (Wade 1983). This work on binocularity was presented to the Royal Society in London by using these paired outline drawings of the same geometrical figures, as the drawings would be seen by either eye respectively. The Wheatstone demonstration also used a stereoscope, an instrument he had invented, to clearly demonstrate how our two eyes fuse what each eye sees into one image. The stereoscope did this by precisely superimposing two paired drawings. It is important to keep in mind that the superimposition of the paired drawings was perceived by members of the audience due to the combination of lenses and mirrors that were a part of the instrument's design.

You can experientially understand what Wheatstone's demonstration was about if you close one eye and extend a finger so that it is pointing at a specific spot. Now, without moving your finger, open that eye and close the other eye. As you can see, your finger is not longer pointing at the same spot. Wheatstone was commenting on this visual experience as well. But he was also doing more and this is what made the instrument most exciting scientifically. More specifically, his scientific commentary effectively conveyed how the slightly different image formed on the retina of each eye is due to each eye's different position in space. While it was not empirically established (until the twentieth century) that our brains actually fuse the two slightly different images our eyes see, Wheatstone's work did demonstrate to his audience that the robustness and singular form they saw with the stereoscope was neither inscribed in the image per se nor due to added cues.

Please keep in mind that it is because the paired drawings he presented were simple that the audience was willing to accept his explanation that the two images were superimposed to create the 3-dimensional perception they experienced. As he explained:

> For the purposes of illustration I have employed only outline figures, for had either shading or coloring been introduced it might be supposed that the effect was wholly or in part due to these circumstances, whereas by leaving them out of consideration no room is left to doubt that the entire effect of relief is owing to the simultaneous perception of the two monocular projections, one on each retina. (Wade 1983, p. 72)

He continues:

> But if it be required to obtain the most faithful resemblances of real objects, shadowing and colouring may properly be employed to heighten the effects. Careful attention would enable an artist to draw and paint the two component pictures, so as to present to the mind of the observer . . . perfect identity with the object represented (Wade 1983, p. 72).

Today Wheatstone's work in vision and perception is often linked with the work of his colleague Sir David Brewster (1781-1868). Although the men were contemporaries and shared an interest in visual science, their rivalry becomes clear when reading their correspondence, recorded debates, and scientific writings (Wade 1983). Both Brewster and Wheatstone, nonetheless, agreed the camera could aid empirical research. As a result, both men worked closely with early photographic pioneers and eventually the fruits of these collaborations entered the culture as a whole. Indeed one obvious outcome was how the camera's ability to depict the physical world would expand our understanding of binocularity as well as our understanding of how we see in general. Less obvious is the way in which the camera stimulated photographic artistry.

When we survey photographic images we also see the stereoscope stimulated experimentation, particularly in regard to formal, visual values. Briefly, artistically inclined photographers were enthusiastic about new aesthetic possibilities and the visual challenges the camera provided. Practitioners were also inclined to experiment with optical effects and chemical processes – the reflection in the water we see in this photograph by Carleton Watkins is one of these visual experiments. Moreover, once Brewster invented a hand-held and easy to use stereoscope (in the 1840s), much like the one on the screen and the binocular camera it became possible to more fully appreciate the stereoscopic experience.

In sum, while artists frequently introduced aesthetics to image-making, scientists were more enthusiastic about the camera's accuracy (with all of its initial limitations!). In the long run the work with the camera led to film, video, and many of the technologically based genre of today. The scientific work, on the other hand, led to later empirical work and is also reflected in theoretical trajectories of our time.

For example, unresolved visual issues in the 19th century have a contemporary relevance due to the close parallels that can be found in theoretical stances that surround vision and the brain today. In fact, the theoretical differences expressed over a century ago by Brewster and Wheatstone are like those found in contemporary cognitive science theories. This has come about due to the fact that some theories are based upon analyses of the visual projection (as Brewster proposed) and some give more weight to inferential or cognitive processes (the approach Wheatstone favored). Indeed the nineteenth century theories have been rephrased rather than replaced (Wade 1983).

The Colorblind Artist

Empirical studies, nonetheless, have given these debates a quite different foundation. While the camera's mechanical eye helped us better understand how we see in the nineteenth century, scientists of the twentieth century learned that the retinal images our eyes receive are in fact evaluated by our brains. To oversimplify, this means that we actually 'see' with our brains.

Specific studies, such as Oliver Sacks' work with the colorblind artist Jonathan I. have offered a glimpse into some ways in which brain studies can be related to artistic cognition. In this case, technologically produced brain scans of this artist's brain showed how the history of an individual has a tremendous impact on how the brain 'sees' and develops (Sacks, 1995).

Briefly, Jonathan I. had been a painter who had always relished color before an accident deprived him of the ability to see any colors. Before this accident Mr. I.'s work was colorful and highly non-representational. Once the automobile accident left him unable to see color at all it was discovered that this accident only damaged the section of his brain that allowed him to see color (V4). Perhaps of greater importance is that the depth of the overall change altered his entire way of being. By this I mean he did not lose just his perception of color, he also lost his sense of color imagery, the ability to dream in color and even his memory of color.

Nonetheless, after a year or more of experiment and uncertainty, Mr. I. moved into a strong and productive artistic phase, as strong and productive as anything in his long artistic career. The black-and-white paintings produced at this time were highly successful and people commented on his creative renewal when seeing this new 'phase' he had 'moved' into.

His success is perhaps more meaningful when we reflect on the fact that very few people knew that this new phase was anything other than an expression of his artistic development. They failed to recognize that it was brought about by a calamitous loss (Sacks, 1995).

But, more to the point, the road to his renewal was not a simple affair. After the accident Mr. I.'s first impulse was to paint in color anyway and with his achromic vision he produced some rather unintelligible results. Sacks explains that Mr. I.'s initial sense of helplessness slowly gave way to a sense of resolution to live and paint in a black and white world as fully as he could. This resolution was strengthened by a singular experience about five weeks after his accident. Sacks reports that Mr. I conveyed that he was driving to his studio one morning and, saw the sunrise over the highway, the blazing reds all turned into black. He explained, "The sun rose like a bomb, like some enormous nuclear explosion" and he asked himself "Had anyone ever seen a sunrise in this way before?"

Inspired by the sunrise, Mr. I started painting again -- he started, indeed, with a black and white painting that he called Nuclear Sunrise. What is important to keep in mind when thinking about his black and white "nuclear sunrise" is that Mr. I later explained this first painting by saying, "I felt if I couldn't go on painting, I wouldn't want to go on at all." (Sacks, 1995a, p. 14)

Then, once Jonathan I. resumed painting, his initial painterly efforts were filled with emotion. Then he turned to representational themes, although he had not worked in this mode for many years. Sometimes he attempted to show his black and white world to others, as his picture of leaden fruit illustrates. At other times Mr. I. performed tasks. These tasks allowed others to compare his way of seeing with work composed by people with normal color vision and drawings of red-green colorblind subjects. He even experimented with deliberately bringing color he could not see into specific areas of his non-representational work. What needs to be stressed is that since he continued to paint researchers were able to use his brain to explore how a brain could adapt to radically new modes of expression and new ways of seeing.

In Mr. I.'s case there are two areas that are particularly noteworthy in terms of both art and science. First, the technological instruments developed at the end of the twentieth century made it possible for scientists to record this artist's re-orientation to painting and seeing structurally. As a result, as Sacks rightly points out, this kind of case allows us to trace how plastic the cerebral cortex is and how the cerebral 'mapping' of body image, for example, may be drastically reorganized and revised in cases of the special use or disuse of individual parts. Second, the data recorded on his brain was also recorded in his artistic experiments. The compositions thus offered an alternative vantage point. We can use this vantage point to see how he adjusted to visual anomalies in his practice.

Conclusion

Both of these studies outline how art, science, and technology have furthered our understanding of vision, art, creativity, and imagination. Cooperative efforts in these two cases were not driven by artistic goals. Nonetheless, in each case we find that the empirical work furthered our understanding of visual art by enlarging our grasp of what we see, how we depict what we see, and human creativity in general. Each case, as a result, offers a means for seeing that imaginative and concrete approaches cross domains in unexpected ways. In summary, the forms we create expand our perception of the complex ways in which art, science, and technology interface.

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