

# Vision: Nineteenth Century Revisions to the Western Matrix

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Nineteenth century revisions to the visual matrix offer a means to re-configure our ideas about modernism and modern values (such as progress, individuality, self-expression, and independence). Innovative developments in visual science and photography that dramatically altered the visual terrain throughout the nineteenth century demonstrate this and are the focus of this paper.

## Visual Science

Visual 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 (Wade 1983). This work on binocularity was presented to the Royal Society in London by using a stereoscope he had invented and paired outlines of the same geometrical figures, as the drawings would be seen by either eye respectively. In summary with the stereoscope Wheatstone (1) clarified how we see, (2) described that paired images can appear as one image to a viewer, (3) conveyed that two correctly spaced flat images can appear to have a 3-dimensional quality, and, finally, (4) demonstrated that the way we perceive the world does not correspond to the kind of one point linear perspective artists have presented since the Renaissance. (In Renaissance perspective the sense of depth is technically created using vanishing points that are constructed using a one-eyed or monocular vantage point.<sup>1</sup>[1])

It is easiest to conceptualize Wheatstone's presentation on binocularity experientially, using a freely viewed stereogram. This photographic pair will converge if you stare at a point between the two dots, as if you are looking through the surface, until the dots merge at a point in the center and you see three dots. Once this parallel fusion is in place, without blinking, lower your eyes to the 3-dimensional image that will now appear as a result of the superimposition of the left and right views. The exceptionally robust, 3-dimensional quality you see is a result of how your eyes are superimposing the slightly different images on the left and the right of the stereogram.

When looking at this photographic stereogram it is critical to keep in mind that the stereoscopic experience using the photographic stereogram is somewhat different from what Wheatstone presented with his line drawings. This is due to the greater complexity in the photographic stereogram, an element that is a result of the camera's ability to record complex vantage points. [The difference will be easier to conceptualize if you now try to fuse a pair of line drawings.]

Another element of importance in considering the 3-dimensional quality of the visual superimpositions is that Wheatstone demonstrated the scientific concept using a stereoscope he had *invented* specifically for this purpose. With the instrument it was possible for people to perceive the then strange concept using their own eyes. In short, Wheatstone's stereoscope was able to convincingly demonstrate the hitherto unobserved phenomena of binocular vision because the stereoscope's design was based on measurable distances between our eyes and thus able to precisely superimpose the paired drawings *for the viewers*. This means successful viewers immediately saw that flattened 3-dimensional forms do not look like a single flat image drawn in perspective nor like exact counterparts of a physical objects as the objects are extended into space. Instead, as the stereoscope showed, when we look at the world two slightly different visual experiences are merged to appear as a whole and the singular whole has a quality that differs from the perspectival depth of a singular form drawn on a flat surface.

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<sup>1</sup>[1] The linked image is 'The Healing of the Cripple and the Raising of Tabitha' by Masolino (1425). Note the central convergence of structures from the front of the canvas to the far distant background.

Wheatstone's own words best explain his methods and intentions:

For the purposes of illustration I have employed only outline figures, for had either shading or colouring 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. 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).

### **Visual Science and Photography**

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 and theoretical disagreements become 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 that the new ways the camera could depict the physical world were used to expand understanding of binocularity as well as how we see in general. The camera's accuracy and ability to render quickly (even with all of the camera's initial pictorial limitations!) in fact served scientists in several ways. One was that the camera permitted scientists to put aside the tedium of making precise pairs of perspective drawings -- with all of their possible errors -- when studying binocularity. Scientists also found that photographs allowed studies to consider significantly more complex visual relationships.

What is less obvious is the way in which the technology stimulated photographic artistry and how possibilities began to be explored in earnest once Brewster invented the two-lens binocular camera and an easy to use stereoscope (in the 1840s). While this paper can only touch on the topic briefly, it is important to note these explorations were multi-faceted and enthusiasts quickly recognized new possibilities, just as they immediately saw camera was a tool that could further novel and compelling visual exploration.

The key point here is that technological innovations challenged both artists and scientists to see in new ways and, as a result, impacted the nineteenth century community in multiple ways. The foundation of photography is particularly noteworthy, for the literature of the invention shows that photographic processes were independently invented by artists and scientists. The primary French contributors were artists (Nicephore Niepce and Louis Jacques Mande Daguerre), while the primary English inventor (William Henry Fox Talbot) was trained in several sciences. What is most relevant from a visual standpoint is that the photographic processes, like the stereogram and stereoscope, were invented in the 1830s. Thus photography and the scientific advancements connected with binocularity coincided chronologically and are logically paired contextually. Perhaps harder to perceive is that each innovation also enlarged our information base in a different way and these enlargements interfaced.

Viewing reproductions as a whole we quickly see the variety of impulses recorded. The composite demonstrates that superficial perceptions recorded with a camera differ from the kind of active viewing more serious practitioners used when producing innovative, photographic work, as will be discussed. Thus, and of perhaps greatest importance, nineteenth century prints show that photographic images covered a large spectrum of possibility. While some stereograms advanced scientific investigations, many more were conceived for entertainment or to simply record the world. Likewise, while the public frequently saw photographs as a form of entertainment, we can also find examples of photographic stereograms that clearly go further, demonstrating that many of the new practitioners were artists, interested in subtle, visual, aesthetic statements.

Given the cross-disciplinary background and immediate enthusiasm for the camera it is not surprising that the technology was explored from every angle by those drawn to the camera's potentials. Reviewing photographs as documents it is critical we not lose sight of this and the fact that the printed images at times reveal the kind of artistry that emerges when practitioners find the activity of seeking to solve challenging problems is a creative pursuit, exciting for its own sake and without need of narrative embellishment. Also, in turning to the various processes we find a visual record that illustrates the efforts of practitioners while also demonstrating the complex and creative challenges that accompanied the growing understanding that images could be 'fixed.' Finally, the record shows that many early nineteenth century photographs contain the formal, visual qualities generally associated with modernism.

This evidence of modernist-like qualities in the early and mid-nineteenth century suggests we would benefit in re-thinking the linear chronologies generally presented to describe photography and modernism, an area I will consider at the end of this paper. But before turning to modernism it is important to explore the ways in which photographic practices crossed domains and the degree to which new kinds of 'eyes' were being formed as the practitioners began to look at the world through the lens, continually pushing the ever-changing technologies in novel directions.

For example, the clear, crisp daguerreotypes, invented in France in 1839, were produced on silver-plated copper sheets. These images generally had a glittery, reflective surface and are exquisitely detailed. The photogenic drawings of Talbot and others, on the other hand, were soft images. Produced when sensitized paper was exposed to light until an image became visible, the images were fixed with water and, when stabilized, lacked the detail of the daguerreotype. Calotypes, an extension of the photogenic process, were produced when sheets of paper were brushed with salt solution, dried, and then brushed with a silver nitrate solution. After being dried again, the paper was used in the camera. Unlike the daguerreotype, the calotype could be used to produce multiple copies of any image. Still, like the photogenic drawing before it, the calotype contained less detail than the competing daguerreotype.

These examples are, of course, only some of the early variations practitioners used in the basic process of fixing the image. However, viewing the variations that were tried, even in this limited way, allows us to establish that many subtle perceptual differences defined the images as artists began to experiment with possibilities (Newhall, 1982; Trachtenberg, 1989).

### Artistic Photography

Stylistic differences offer another perspective. Here too we see practitioners were stretching the technological possibilities as photographers increasingly produced singular and stereo photographs. For example, Julia Margaret Cameron (1815-1879), born in Calcutta and educated in Versailles, took up photography in 1863 while living in England. Her singular images avoided the perfect resolution and minute details that glass negatives permitted opting instead for carefully directed light, soft focus, and long exposures (counted in minutes when others did all they could to reduce exposure to a matter of seconds.) (Daniel, 1999). All of these elements explain why her many prints, such her 1867 portrait of Sir John Herschel, are extraordinary.

Carleton Watkins (1829-1916), a California photographer, worked with a stereo camera. This gave him the option of working with singular and stereo images. Visually engaging with the photographs we immediately recognize that the reality Watkins presents is not so much an intellectual encounter but an experiential affair (Nickel, 1999). Douglas R. Nickel partially explains this when he notes that Watkins' stated creative program was finding the spots with the best views. Of course, and I'm certain Nickel would agree, Watkins' lyrical results say more than any explanation could because the prints are intended to be

visual presentations. They are photographic images one must experience. They simply defeat interpretations, particularly those of a narrative or symbolic nature.<sup>2[2]</sup>

Watkins' artistry is particularly apparent when we look at his breathtaking photographic recordings of California's natural beauty. Revealing a practiced, technologically astute, subtly Watkins mirrors a quality frequently cultivated in the work of those who focused on the artistic possibilities of photography. No doubt the positive response of viewers to the visual elements we see explains why a friend confided that Watkins took pride in his artistry, reporting Watkins remarked that "everybody says [the photographs] are better, softer, more artistic, etc. (Palmquist, 1983, p. 59) than the work of other California photographers. Indeed Watkins was an artist known to experiment as he sought for better ways to make his images both legitimate and legible.<sup>3[3]</sup>

In summary, despite being produced as commercial products, Watkins' singular and paired views demonstrate the exquisite possibilities photography offered. Maria Morris Hambourg, Curator of Photography at the Metropolitan Museum of Art in New York, explains Watkins' aesthetic as follows:

In landscape, as in human life, meaning lies less in objects than in relations, the links that tie specific incidents and entities together as an event or a place. In grasping myriad related connections and recording them photographically, Watkins created an intelligible world that maps and illustrates mental activity, mimicking the skeins of meaning our perceptions generate. His photographs awaken us to the exquisite pleasure of active seeing, inducing that conscious visual alertness we experience when viewing landscapes by Cézanne, for example. Only here the artist's mental calculations are not laid down in painted strokes. They merge diaphanously with the trees and dissolve on the surface of the objective world.

She continues.

Looking at the photograph, we think we see the true structure of nature, its orderly scaffolding and superb textures merely disclosed; it takes real imaginative effort to recognize that no things in the picture nor the relations between them were self-evident. Everything ÷ the slant of a shadow on fresh clapboards, the depth of the darkness in cracks in pine bark, the silkiness of slightly shimmering water ÷ is the delicate trace of the artist's considered attention. (Hambourg, 1999, p. 16)

Hambourg's description of Watkins' work speaks only to Watkins' art. Others have placed this kind of artistry in a larger context. Crary, for example, proposes that we understand both nineteenth century photography and the avant-garde art of the nineteenth century as overlapping components of a single social surface on which the modernization of 'vision' was everywhere taking place (see Crary, 1992). This is to

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<sup>2[2]</sup> Watkins' 1861 Yosemite print entitled "Grizzly Giant, Mariposa Grove, 33ft. diameter. is unusual in being both visually compelling and a print that includes a carefully contrived point. In fact, one of the classic Watkins stories stems from the impact of this Yosemite print on people in the Eastern United States. A writer in the December 1866 issue of *Philadelphia Photographer* offers a summary, explaining: "The tree was manifestly a very fine one, but we felt disappointed in regard to the apparent size . . . a giant perhaps but not a very great one ÷ tall, but not particularly gigantic. On looking more attentively and minutely at the photograph, we discovered a group of men at the base of the tree! They were so small that at first, they had escaped notice, but being once seen their effect upon the picture was magical. The tree rose as we followed up its trunk . . . and towered aloft in majestic proportions, till at last the eye . . . took in the most stupendous growth, and we felt that we looked indeed upon a grizzly giant. (in Nickel, 1999, p. 25).

<sup>3[3]</sup> Berkson explains that for his 'stills' Watson used exposures through a lens uncapped for periods ranging from 15 seconds to a half an hour. For images of falling water, as in what became the graphic efflorescences of Yosemite and Mulnomah Falls, there's the shock of salient photographic time: a cleanly delineated, brilliant blur. With objects, the simplest, starkest symmetry would do (Berkson, 2000, p. 126).

say that the developments in optics and vision, like photography and the emergence of modernist painting, can be seen as a part of a larger, more fundamental transformation occurring within Western culture.

## Conclusion

Visual science and photography are only a small part of a part of a larger picture. Therefore, and in conclusion, it is important to state this and to, albeit briefly, integrate visual science and photography within the context of western art history as generally presented. To be sure, scholars have increasingly noted that changes in the ways we see have coincided with and even anticipated social changes. Yet, often the broadly based chronologies discuss scientific contributions in a descriptive manner that invariably fails to precisely convey the core of what scientists added to empirical understanding. Looking closely at scientific advancements like binocularity we find increasing our knowledge base often included an experiential component and were additions to the scientific vocabulary were not merely conceptual, intellectual, or intuitive theories. Technological innovations, such as photography, likewise aided people in clarifying how and what we see in definitive and often surprising ways. Given this, it is important to specifically consider how empirical additions to our information base revised ideas about seeing in the nineteenth century in general, as I have briefly outlined above. Moreover, when adding scientific advancements to the overall equation it is also important to recognize that visual practices in art and science were not alone in fostering revisions to the visual matrix of that time. Literary voices, too, are a part of the story.

One of the more forceful voices of the 19<sup>th</sup> century was that of the poet and critic Charles Baudelaire (1821-1867). Baudelaire, as is well known, presented an extremely hostile view of photography, linking the practice with mass taste and asserting that photography had contributed substantially to the destruction of the imagination and true art (Edwards, 1999, p. 83). Baudelaire summarized the tasks he saw for the modern artist in his 1863 essay "The painter of modern life." (Baudelaire, 1986), where he says that any adequate form of modern art had to address not merely the 'eternal and immutable' but also the ephemeral and contingent – much as Manet does in 'Concert in the Tuileries, 1860-62.'

Yet, on inspection, we first of all see nineteenth century photography was more than a form of documentation and to define the medium as a medium of mass taste does not stretch far enough to include the deeply lyrical compositions inventive photographers felt challenged to produce throughout the world. We can find numerous examples that illustrate how many turned to photography because they were fascinated by what the technology could do when pushed to the limit. These artists, and Carleton Watkins is one good example, were not detached from nature and society so much as engaged with visual possibilities in several forms, on several fronts.

Also, on close inspection we can find many of the nineteenth century images that contain the formal values and the kinds of aesthetic arrangements we would see as compositionally modern today, as if products of a Baudelairean context, were produced in ways that deviate from Baudelaire's equation. This suggests that mapping a Baudelaire-like view on art in general highlights the artistry of some artists at the expense of others. The anomalies likewise suggest that the kind of identity Baudelaire praised does not stretch far enough to acknowledge the imaginative eye of an often 'modern' photographer. Here too Carleton Watkins is a good example.

Watkins, for example, crafted exquisite photographs that sometimes alternate between an elaborate manipulation of abstracted space, compositional torque, and acute detail. At other times Watkins' images present an almost naïve and totemic directness that suggests the kind of formal qualities we might expect of an artist working after the advent of Cubism, but not, as Nickel points out, of a struggling tradesman in San Francisco in the 1860s (Nickel, 1999, p. 20). In other words, while Watkins prints are easily termed modern, he was not a modern artist in a Baudelairean sense. He never took on the identity of a middle class figure, wandering in the culture of the spectacle, noting down the unstable, trivial, and superficial modes of the modern crowd within its artificially constructed environments. Even harder to explain in the 'spectacle' framework is that someone like Watkins, who began working less than twenty years after

photography's invention in 1839 his images, can be stylistically compared with the French Impressionists who worked after him chronologically and from a different vantage point, so to speak. As Berkson insightfully writes, one device Watkins tended to use was the smallish, highly reflective, often geometrical detail placed at the center of the scene to snap the scene into focus, much like the tiny dabs of crimson Monet and Renoir placed in their otherwise de-centered scenes (Berkson, 2000, p. 126).

We encounter additional anomalies when we turn to painting per se. As discussed above, a limited and linear chronology can too easily explain away the subtle differences between active and casual perceptions. Conclusions, as a result, are too simplistic. For example, we can retrospectively see why Manet's notations led later critics to group Manet and Baudelaire with others (such as Balzac) when they characterized art of the 19<sup>th</sup> century. Likewise, we can claim retrospectively that compatibilities in the philosophical dispositions of those grouped set the tone and the agenda for what we now term modern art and literature. In addition, we can say the characterization has a logical basis. Yet, the logic we see from our future position, to my mind, does not adequately define the period as a whole. Clearly, even within the limited scope of Western painting there are critical anomalies when we look closely.

For example, while Baudelaire privately admired Manet, although with some reservations, it was Constantin Guys (1805-92) and Eugene Ferdinand Victor Delacroix (1798-1863) who were Baudelaire's touchstones for greatness (Baudelaire, 1986, 1998). In fact, some modern critics have rebuked Baudelaire for not discovering Manet at a time when Baudelaire was in a position to do so (Edwards, 1999). Broadly speaking the generalizations then point to problems in the traditional view that go beyond those inherent in assuming photography was either a form of documentation or should be characterized as a 'low' art that served to free painters from the need to blindly copy nature. Moreover, there is a tendency in these discussions to overstate the prominence of realistic and naturalistic painting in 1839, when photography was invented. A painting such as Delacroix's 1830 bare-breasted Liberty leading the people illustrates that when we actually look at the work of the nineteenth century we quickly discover that Western painters around 1839, the year in which photography was invented, mostly favored a theory and practice premised on idealization rather than an optically-based, naturalistic realism. My point is not so much that 'reality' can be staged, and was often staged by photographers whether it be to imitate paintings or to contrive social statements. Rather I believe the Delacroix painting shows that the story of photography is not encapsulated by the idea that once we had the camera to record the world painters realized that they no longer needed to focus on literal subject matter. In fact, comparing actual photographic documents with paintings suggest this view is inaccurate if not in large part simply incorrect.

In addition, research reveals many examples of impressionistic-like works -- with their optical emphasis -- were completed early in the 19<sup>th</sup> century, long before Manet, Baudelaire, and the Impressionists began to question the conventions of their time in France. For example, works of the German painter Adolph von Menzel (1815-1905) in the 1840s and 1850s are particularly noteworthy. Von Menzel made his reputation in the 19<sup>th</sup> century as a court painter and his small, spontaneously conceived paintings were unknown while he lived ( see Gaiger, 1999; Keisch & Riemann-Reyer, 1996). One element that makes von Menzel's Impressionistic-like private pieces exceptional is that they document a concern for the effects of light and the subtle modulations of tone and color. Conceived twenty years before Manet began to produce the work that is now pointed to as the foundation of modernism and Impressionism, von Menzel's work, like that of the English painter J. W. Turner (1775-1851) is not easily fit into a linear modernist canon. Yet Turner, who died in the mid-nineteenth century, was the pre-eminent modern painter, at least according to John Ruskin's 1843 book entitled *Modern Painters* (Ruskin, 1843).

In conclusion, using an enlarged visual matrix of the nineteenth century broadens our understanding of modernism and clarifies that the introduction of new ways of seeing was cross-disciplinary. As the information crossed disciplinary domains we find practitioners from many fields introduced novel work. Exploring this work, in turn, clearly demonstrates a casual and superficial relationship with possibilities differs from the kind of attentive focus that is possible when one is engaged with what one sees. To be sure, while superficial viewing was a form of entertainment enjoyed by many, innovative discoveries of the nineteenth century also significantly changed how we see the world and our understanding of vision as well.

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