

# **A Scientist's Vision Of Art**

## **A Review of Margaret Livingstone's *Vision and Art: The Biology of Seeing***

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ABSTRACT: *Vision and Art: The Biology of Seeing* by Margaret Livingstone is reviewed. Livingstone's analysis balances genes and experiences in proposing explanations that illustrate commonalities between art and visual perception. The book contributes to the literature that applies visual perception research to artwork, although it fails to probe where artistic visual processing might differ from visual processing *per se*.

Visiting a museum one is often surprised to see how many of the works incorporate modalities studied by visual scientists (e.g., depth perception, blurring, texture, etc.). Yet, when reading the scientific literature one finds scant indication of these overlaps. Similarly, in the art literature one is likely to find these features characterized in terms of context, narrative iconology, intuition, and subjectivity rather than visual science. Margaret Livingston's book, *Vision and Art: The Biology of Seeing* is an exception to this. Successfully linking art with visual perception, she demonstrates that commonalities exist between artistic sensibility and our visual apparatus. As a full-fledged neurobiologist, moreover, she has the background to simplify the range of scientific information that demonstrates intersections between visual art and visual science, without explaining away the power of art.

Artists and the general public will no doubt welcome her clear, concise explanations about the 'tricks' artists employ to excite us. Visual artists will find much to think about in regards to how their peers creatively (and intuitively) utilize texture, luminosity, color, brush technique and depth perception. They might also pick up some ideas for experimentation in the studio. Those captivated by art are likely to relish the way this beautifully presented full-color publication probes artistic devices and the range of artistic styles and eras studied. Notables discussed include Rembrandt, Vincent van Gogh, Pablo Picasso, Bridget Riley, Chuck Close, and many more contributors to our visual lexicon.

Livingstone approaches the subject in terms of a marriage between genes and experience. Information is framed primarily through the 'Where' System that defines the locations of objects (motion perception, depth perception, spatial organization, figure/ground segregation, etc.) and the 'What' System that characterizes their properties (object recognition, face recognition, color perception, etc.). While the differences between these two systems offers a viable approach to organizing and explaining the nuances of visual perception, the book is less successful in conveying how artistic vision differs from vision *per se*. The failure to distinguish these two visual modes was particularly evident in the way examples were introduced. Throughout the book the author integrates well-chosen examples to demonstrate areas of interest in visual science. For example, Isia Leviant's *Enigma* (1984) and Bridget Riley's *Fall* (1963) do effectively convey that the juxtaposition of luminance-contrast borders with areas of equiluminance. It is obvious that we experience a powerful illusory motion from the high-contrast lines. Leviant's circles begin to turn and Riley's repetitive pattern offers an illusory stereo depth. Yet, while the effects are identified, and clearly affect the eyes when we view the work, there is little indication of what the artist did to study and then create the effect illustrated. This process, I believe, is more than illustration and without seeking out the mechanisms particular to the artist, the work introduced objectifies the art more than it studies artistic visual processing.

Given this, what I believe the treatment lacked was some thought on how artistic inventiveness and visual processing might be interrelated. Throughout the book it occurred to me that it was unfortunate that Livingstone did not juxtapose her excellent examples with an artist (or several) who open the door to how a practitioner might study and learn more about the modalities. Jan van Eyck (1390 - 1441), for example, would have been a powerful reference point for many of the topics addressed, including geometrical references, light and color, luminosity, texture, depth perception, visual interpretation, etc. Long considered the inventor (or perfector) of the oil paint technique, his work would have added key information to the role of artistic methods in general and historically. For example, when Livingstone illustrates how artists have dealt with the limited range of pigment reflectances she doesn't seem to recognize that the work referenced mixes categories. Her early examples are images that were contrived before oil paint was a common medium. Artists knew that egg tempera and gold leaf had limitations and recognized that when employing these materials it is almost impossible to show light within a picture. As a result they developed a lexicon that side-stepped the difficulty in convincingly representing the 'visual idea' of luster, sheen, and reflection. To

oversimplify, the problem is that the egg gives a surface that is too matt and the gold will appear as either a dark or pale background (depending on the light). When artists learned how to mix oil and pigment, Jan van Eyck being the master here, the visual quality of painting expanded due to oil's capacity to represent the physical world we see more successfully. While it still wasn't possible to re-create the variations and light of the physical world it was possible to definitively expand how color, light, luminosity, and physical reality were portrayed/represented on a panel or canvas. The technological advantage the mastery of oil paint offered is not found within our visual system per se but how this breakthrough expanded the artistic repertoire does appear in the luminance and gradations artists presented. While the historical chronology records a new direction, the development that linked art with visual processing wasn't merely a new trick indicating stylistic changes.

Van Eyck's inventiveness shows the artistic 'eye' particularly well, which is why he was long credited with inventing oil paint. Moreover, his work (and one might choose other examples) shows the degree to which an artistic dedication might revamp our visual experience descriptively and metaphorically. To continue with this example, van Eyck's contributions are particularly interesting both visually and for other reasons. Many ideas in the visual science literature are derived from studies of abnormal or generic visual systems. Those who have used a visual anomaly to offer an insight into art (or visual science) are perhaps harder to discover. In van Eyck's case, some of the most insightful research was conducted by the renowned art historian Erwin Panofsky, who was anisometric, seeing clearly at a distance in one eye and at close range in the other. It is said that Panofsky was able to pinpoint van Eyck's special ability to present images that operated as both a microscope and a telescope because of the way his [Panofsky's] own visual system operated. Livingstone's omission of specialized artistic processing was not a major flaw and hopefully future research into this area will add more studies that link what is particular to the artist to the commonalities studied by visual science.

A second limitation of the book was the no doubt inadvertent way in which it illustrated many of the areas discussed. To her credit, Livingstone mentions on several occasions that the texture or depth we would encounter in an original is lost in the reproduction. This is true and I believe a good way to encourage readers to visit the works and experience them full-size and with all of their blemishes visible, so to speak. She also adequately distinguishes color mixing in vision, paint, printing, and photography. Unfortunately, for whatever reason, examples in several cases present colors that do not correspond to the printed illustration. On a page with a striking yellow background, the caption refers to the orange background. On another page where the colors appear as Venetian red and slate, one explanation refers to the tan and blue of the illustration, while another on the same page describes these colors as red and gray. Discussing these discrepancies with others led to some discussion about how we might define the colors we perceived and the degree to which those reproduced matched the terms adopted in the text.

Once reading turned to interactive evaluation, the question "Do you see Red like I see Red?" seemed to take on major importance. This is a much-debated question in visual

perception and consciousness studies, where discussions of qualia now are used to help define the issues. (Generally qualia are defined in terms of a mental state with a very distinctive subjective character.) While some, such as Dan Dennett, deny the utility of the concept, others debate where they fit within an explanatory model. One view is that qualia are real but are reducible to a physicalist explanation (e.g., Shoemaker, Tye). On the other side we find those who say that qualia are real but are not capable of reduction to a functionalist or physicalist explanation (e.g., Kim, Chalmers, Levine, McGinn). Livingston concludes that

[T]he question of whether you see red like I see red is basically semantic. There are indeed many people for whom the experience of red is quantifiably different from my experience of red, starting with the kinds of cells in their retina that are activated. But, because our brains are built by both genes and experience, we can also say that your experience of red differs from mine simply on the basis of knowing that our life experiences are different. (p. 33)

As noted, *Vision and Art: The Biology of Seeing* approaches the experience of art generically and thus the specialized experiences within the artistic brain that distinguishes artistic processing from that of normal (and abnormal) processing is never approached head-on. To her credit, she does not adopt the axiomatic assumption that art is about spirituality, a view that has limited the work of people like Semir Zeki (see, for example, *Inner Vision: An Exploration of Art and the Brain*, 1999). Her study, however, would have benefited from some discussion of his idea that artists are neurologists, studying the brain with techniques that are unique to them. Instead, like Robert Solso's *Cognition and the Visual Arts* (1994), Livingston probes for connections linking art and science with greater specificity. Her use of full-color illustrations distinguishes her contribution from Solso's. In addition, his pioneering work in this domain was more concerned with the experience of art in terms of history, culture, and cognition. All three of these works demonstrate the degree to which visual scientists are beginning to recognize what artists have to add to scientific research and consciousness as well. Personally, I find it exciting that recent scientific research on vision and visual perception is now a tool that we are using to distinguish philosophical predispositions about visual art from actual brain operations.

## References

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