Brain Trust

JONATHAN GILMORE ON ART AND THE NEW BIOLOGY OF MIND

Claude Monet, *Poppies at Argenteuil*, 1873, oil on canvas, 19½ x 25½".

THE DREAM of discovering a science of art once took the form of attempting to render systematically the variety and appearance of the visible world, an endeavor intimately entwined with Renaissance developments in mathematical perspective, anatomical drawing, and optics, and, later, with seventeenth-century catalogues of nature. In more recent times, the project has turned inward—to the body and mind—expressed as a desire to hunt art and aesthetics back to some allegedly biological source, motivating work ranging from Hermann von Helmholtz's thesis that the mechanics of the human eye made it in principle impossible for a painting to produce the same visual effect as nature (*On the Relations of Optics to Painting* [1871–73]) to Max Nordau's infamous fin de siècle positing of a common neurological deficit behind modern criminality and the degeneracy of modern art. But even the most well-founded of those physiological and psychological theories connecting art to the mind were developed in the complete absence of any genuine study of the anatomy and operation of the brain, a form of research that became possible only in the past thirty years, with techniques such as PET scanning and MRI deployed to study the behavior of the brain on the cellular level.

That such neurobiology might offer a new science of art was the premise of "Art and the New Biology of Mind," a conference held this past spring under the auspices of the Italian Academy at Columbia University in New York, bringing together a distinguished roster of scientists and artists in a daylong colloquy on the relationship between recent advances in neuroscience and the visual arts. The event's focus on neurobiology reflected a more general contemporary impetus to explain through biological means cultural phenomena once thought to be the provenance of historical, linguistic, psychoanalytic, philosophical, or social explanation. In this respect, neuroscience promises—or threatens—to be the next grand unifying theory in the human sciences. Major figures in contemporary science of the brain such as Antonio Damasio, Vittorio Gallese, Eric R. Kandel, Margaret Livingstone, V. S. Ramachandran, and Semir Zeki were joined by artists Marina Abramović, Laurie Anderson, Robert Irwin, David Salle, and Terry Winters, among others, and by architect Richard Meier and—to complete the sundry selection of well-known creative types—designer Calvin Klein. David Freedberg, the scholar foremost in exploring neuroscience's explanatory potential vis-à-vis art history, presided over the event and, with philosopher Arthur C. Danto, moderated the sessions.

The research presented at the Italian Academy suggests that the neurophysiology of how the brain relates to the world is very different from what our phenomenological sense of that relation would suggest. One important recent discovery shows that the neurons responsible for visual processing are organized into discrete units, each of which plays a specific role in detecting external sensory inputs of only a certain sort. Some neurons "fire" only when exposed to horizontal lines, others only to movement or position, and others only to color. Thus, while it seems that we take in a visual scene all at once, as a gestalt, in fact these isolated features are never reintegrated as a picture, an inner visual representation, within the mind (who, but some mysterious homunculus, would be there to see it?). Indeed, different neurons process information at different rates: The perception of color occurs before that of form, which, in turn, occurs before that of motion. Semir Zeki summarizes these conclusions in saying that we see "with the brain": What we take to be a passive operation of the eyes belongs to an active brain that determines which features of what is registered on the retina will form the content of one's perception.

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The upshot of this and other neuroscientific discoveries for artistic creation was vividly illustrated in Margaret Livingstone's case studies of how familiar but puzzling painterly effects can be explained through recourse to the physiology of the brain. So, for example, Monet endows the flowers in *Poppies at Argenteuil*, 1873, with a shimmering quality by unwittingly exploiting the fact that, while we perceive an object's form by distinguishing its color from its surrounds, the part of the brain that performs this is anatomically distinct from the one that distinguishes position and movement based only on illumination. Because Monet's poppies are roughly equal in luminance to their surrounds even as they differ in color, the brain recognizes them as objects but cannot identify their exact position. Mondrian, too, relies on this effect in his *Broadway Boogie Woogie*, 1942–43, where, because the yellow units are distinguished by color from the background, but roughly identical in value to it, they cannot be readily placed in position and seem to vibrate or shift. Livingstone described her work as only catching up, in scientific terms, to what artists have long known about vision—a sentiment echoed by Zeki, who remarked that he sees artists as neuroscientists, engaged in a like-minded pursuit of understanding how we see. This repeatedly uttered modesty topos soon began to wear thin, leaving some of the invited artists asking what they were there for, save for testimony of what being an artist was like. The problem was that such neurobiological explanations of art (including the perception of color, depth, and emotional response) apply invariantly across the perception of art and the perception of ordinary reality. Eric Kandel, a Nobel laureate who pioneered research on

Left: **Olafur Eliasson, *The Weather Project*, 2003–2004.** Installation view, Tate Modern, London. Photo: Jens Ziehe. Right: **Marina Abramović, *Seven Easy Pieces*, 2005.** Abramović performing Gina Pane's ***The Conditioning***, the first action of Pane's ***Self-Portrait(s)***, 1973. Solomon R. Guggenheim Museum, New York, November 12, 2005. Photo: Kathryn Carr.

memory and proprioperception, allowed that while scientists are captivated by the neural mechanics of vision, creativity, and emotional response, they ought to ask, What's in it for the artists? One might respond by asking, What's in it for the neurobiologists? when their investigations are not about art so much as about examples of visual representations, the identity and functioning of which *as art* is irrelevant to the inquiry at hand. By explaining too much, the science explains too little. A viable neuroscience of art would identify what is distinctive in our experience of art, how art carries meaning—material, contextual, intentional, or historical—or how art contributes to experience, extending sensation, rather than just replicating it. This is a question the work of many contemporary artists already poses: *The Weather Project*, Olafur Eliasson's 2003–2004 installation at Tate Modern in London, simulates a bright sun refracted through clouds and mist but also evinces the place of the spectator within the work, self-reflexively addressing both the experience of nature and the perceiver in and by whom that experience is constituted. If neuroscientists are to recognize the significance of such work for a science of art, they will have to expand the astonishingly narrow range of artistic practices—mainly painting and sculpture—that they study.

One major discovery that suggests a biological foundation for the intersubjective relations among artist, artwork, and audience is of a class of brain cells called mirror neurons. Activated in higher-order brain processes that involve awareness of others' behavior, mirror neurons seem to be the biological basis of empathy, firing in response to seeing a person's actions or emotions in the same way as if one performed the action or felt the emotion oneself. In this way, they suggest a neurological basis for the "projection" nineteenth- and early twentieth-century theorists such as Adolf von Hildebrand spoke of when describing how we simulate in our bodies what we see in works of art—a parallel to Freud's notion of "projection" as an ascription, often hostile, of our sentiments to other people and to the world around us. But mirror neurons are most striking in how they seem to register purely cultural knowledge, responding in a way that reflects an awareness of the point or intention of the behavior of others—suggesting a hinge between biology and culture. Recent work, some of which was discussed by Vittorio Gallese, a discoverer of mirror neurons, has proposed that they serve as the biological bases of everything from a putative increase in aggression among children watching violent television to why readers of novels tend to memorize the position of objects from the narrator's point of view. Gallese remarked that the phenomenon of somatosensory identification holds true even with ordinary objects, as mirror neurons that typically respond to feeling a hand's caress react in similar fashion to seeing merely inanimate objects brush against one another. His conclusion, that these neurological reactions show that "a still life is much less still than we would expect," may be true, but if so, it is for the same reasons that ordinary objects outside of art are much less still (from the perspective of mirror neurons) than we would think.

A more compelling concern from the standpoint of art is how mirror neurons might relate to artistic practices and installations that refer to a spectator's body, symbolically, technologically, architecturally, or, as it were, immanently, in performance. At the Columbia conference Marina Abramović described how she "stages pain" in her work, "transforms the pain," "liberates" herself from it, suggesting how, within the confines of the performance, the suffering she undergoes is in some sense disowned. The question for neurobiology is, What are the connections between the capacity to simulate in oneself the experiences of others and the shifting modes of engagement—visual, intellectual, somatic, aesthetic—that characterize one's response to art? More generally, what difference does it make in terms of neurobiological simulation if the actions we witness—such as Abramović's screaming until she went hoarse (*Freeing the Voice*, 1973) or her recent restaging at the Solomon R. Guggenheim Museum in New York of her own 1975 performance of *Lips of Thomas*, in which she carved a star on her belly—are "framed" performances, sometimes doubly so, of submission to pain?

Many participants spoke of bridging the gap between art and science, but it never became clear why that was a separation that needed to be forded. Neuroscience may serve as the source of a few technical discoveries ready to be exploited for artistic ends, as in Carsten Höller's walls of white lights that flicker at a frequency fast enough to induce brilliantly colored retinal afterimages, an order of continuity of light even when one closes one's eyes. Or neuroscience may be just one more ingredient in the subject matter of artists concerned with mapping different terrains of knowledge, such as Eric Duyckaerts's mock-scientific pedantry; Spencer Finch's recording of his brain waves while watching *Hawaii Five-O* (*Blue*, 1993); or Matthew Ritchie's elaborate pictorial skeins of art, religion, politics, and science. But those hardly seem to be urgent justifications for a science of art. Robert Irwin suggested at the conference that the "sensate world" and the "cognitive world" should not be resolved, one into the other, remarking that were he to worry how it happens that the world is always already formed for him, he would find himself paralyzed. Perhaps what a neuroscience of art should explain is not how to bridge the gap between science and art—whether through a spurious reduction of art to the science of the brain, or through construing art as science by other means—but the significance of the gap itself: what, in other words, art may offer us that science cannot. □

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