Fertile Ground

Increasingly humanists are turning to cognitive and neuroscientists — and vice versa — to gain new insights into perception and experience.

By Janetle Weaver

If you’ve never seen Claude Monet’s Impression, Sunrise, at 1872 painting of a misty harbor at dawn, you may have noticed that the red-orange sun glowing in the sky seems to pale almost instantly outside the surrounding grey clouds. This “optical effect is not just a trick of the imagination, it’s actually a neuroscientifically measurable interplay between the interconnected nature of neural processing in the brain.”

While brain regions that respond to color and the detection of boundaries between our own sky and clouds, exhibit parts of the brain that process light intensity and not, because these shapes could be seen under some conditions as light in a blue-blank, reflect a variety of the process, the sea would look rainier. Because of the lack of illumination, which normally helps us perceive things, the sea appears to move around, and the work of art comes to life. This technique, called alpenglow, has been used by Impressionists and post-impressionists to make their paintings specific, but working artists are not alone in their explorations of how our brain shapes our perceptions. Scientists from fMRI studies of art experience have found that art can significantly alter perception and emotion. Neuroscientists have been moving into the fine art world to understand the impact of art on the brain.

Left Brain, Meet Right Brain

Inspired by conversations with colleagues in Cambridge, Stephen Kosslyn, Harvard’s former dean of social science and John Lindsey Professor of Psychology — and an expert on mental imagery — has organized a two-week summer workshop exploring intersections between the humanities and cognitive science at Stanford University’s Center for Advanced Study in the Behavioral Sciences (CASS). Advanced graduate students and young investigators were admitted from a variety of humanities fields, from fine arts to philosophy, to explore foundational principles of cognitive science and neuroscience and their role in the humanities. “The ultimate goal is to enrich both the humanities and the sciences,” says Kosslyn, who now directs CASBS. Participants will survey a range of topics, from perception and imagery to cognition and motility, and focus on such interdisciplinary questions as why audiences empathize with certain movie characters and how different types of music elicit different emotions. “If you know basic facts about how the mind works, you can begin to understand why some pieces of art, music, and literature are more successful than others,” Kosslyn says. “I don’t think there’s any significant or compelling issue of connectedness between various aspects of the humanities and cognitive science and neuroscience.”

“Focusing these connections has become easier in recent years,” says Anne Harrington, who is a co-director of the summer workshop at Stanford and a professor of the history of science at Harvard. “Neuroscience and the cognitive sciences have themselves become more and more entrenched in things that speak to literary concerns of the humanities,” she says. “That makes the potential for collaboration grows more attractive and potentially much more productive for a larger amount of people.”

Dialogue between areas is changing topics like information processing, memory, aesthetics, emotions, and ethics — and essential for a strong university, adds Harrington, whose most recent book is The Case Within: A History of Mind-Body Medicine. “In the end we’re one academy, and over the long term the established arts are more likely to have a lasting effect in the general population. Artists often close one eye to more easily portray these three-dimensional scenes on flat surfaces using pictorial depth cues, such as perspective, occlusion, and shading. If somebody already sees the world as slightly flatter, they have a built-in advantage when their kids that might make them turn toward wanting to become an artist from the get-go.”

The Literary Brain

By describing the way shaped light streams through a window and falls onto a chair, or the way a man and a woman circle around one another set off a dance floor, writers can evoke mental images that are as virtual as objects we see in front of us, creating rich scenes of sensory engagement on their blank pages or on a computer screen. For literary theorists are coming to appreciate, the effectiveness of these writing techniques can be explored not only through the narrative itself, but through experimental research in fields such as psychology. “A lot of great thinking about the mind goes on across the university, within different disciplines,” says Elif Shafak, the Walter M. Cabot Professor of Aesthetics and General Theory of Value at Harvard, who is considered a leading expert of how literature produces rich interior imagery in her book Written, Dreaming by the Book. “That’s more and more good work toward the idea of working across disciplines — thinking research and new methods of thinking out of the ideas that limit their impact.

To encourage interaction among humanists and scientists, Shafak founded the monthly literary seminar in Cognitive Theory and the Arts in 2000, with Alan Richardson, MPP ’83, a professor of English at Boston College who published The Novel and the Cognitive Turn in 2010. The seminar, held at Harvard’s Menard House, a former home of the National Endowment for the Arts, and more than 30 other events across Harvard, including seminars and public lectures, has brought together faculty and graduate students from neuroscience, literature, music, philosophy, and the arts. John Rothman, a PhD student in the English Department, is a regular attendee at two students from neuroscience, literature, music, philosophy, and the arts. John Rothman, a PhD student in the English Department, is a regular attendee at two students from neuroscience, literature, music, philosophy, and the arts.

“The most important thing going forward has to be to try to create a community in which the fundamentally important insights and methods of people in both camps can be understood and respected.”

The Art of Seeing

Having taken personal inspiration from art for decades, Margaret Livingston, a professor of neurobiology at Harvard Medical School, the world of PhD students in neuroscience, regularly includes art in her presentations to illustrate how vision works.

Early on, Livingston didn’t know much about art history, so she decided to brush up on the topic. While reading an art book in her office in 2000, she came across a picture of Leonardo da Vinci’s Mona Lisa and pondered a question that has tossed admiring of this masterpiece for centuries: Why is Mona Lisa’s smile so sticky? “I looked at it as if I had never seen it before and noticed that the effect had something to do with where I was looking.” Livingston says. When she started at Mona Lisa’s mouth, its surface was shiny and crisp, but when she gazed at the background, the lips appeared blurry. As she was riding her bicycle one crisp fall day, she was struck by an idea. Perhaps the smile’s ambiguity is caused by differences in spatial acuity between the center of gaze and the peripheral vision. Livingston filtered the image to exaggerate either coarse shapes or fine textures, such as lines and edges. She found that the blurry mouth seemed much more cheerful than the sharp one, and so the strength of Mona Lisa’s smile depends on where the viewer looks.

A few years after initiating this discovery, Livingston traveled to Paris to find out whether equilibration could explain the disemboweled quality of the eye in impressionism. During a trip to the Louvre Museum, she entered a room full of Rembrandt self-portraits and noticed that the painter’s eyes did not alight properly suggesting that he had trouble perceiving depth. This casual observation stimulated her to experimentally testable question: Is poor depth perception linked to artistic ability? “Some artists are so talented that you have to consider the possibility that there’s something about their brain that makes them better at art,” she explains. Upon returning to the US, Livingston published a study that shows that a zone in the brain associated with the visual cortex, called the striate cortex, which normally helps us perceive things, the establishment of art tends to move around, and the work of art comes to life. This technique, called alpenglow, has been used by Impressionists and post-impressionists to make their paintings specific, but working artists are not alone in their explorations of how our brain shapes our perceptions. Scientists from fMRI studies of art experience have found that art can significantly alter perception and emotion. Neuroscientists have been moving into the fine art world to understand the impact of art on the brain.

Many Minds Together

Harvard’s Mind/Brain/Behavior Initiative (MHBI) brings together faculty and students from many disciplines since 1993, when then President Neil Rudenstine called for programs that would unite social science and the humanities. Harvard Social Sciences. The program has brought together students and faculty in the arts, humanities, and social sciences.

Rebecca Goldstein, a professor of neurology at Harvard Medical School, the MHBI provides courses, seminars, lectures, and research seminars and builds a community for undergraduate and graduate students, postdoctoral fellows, and faculty who are examining the nature of the mind using a variety of approaches, such as behavioral testing, electromyography, computer modeling, biochemical techniques, genetics, neuroanatomy, and philosophy. The MHBI has offered course programs and secondary fields to undergraduates, but a secondary field in MHBI will be offered to graduate students who “otherwise provide the connective tissue between faculty members in different departments,” says Goldstein.

PHOTO: Mary Stoddard

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