Editor’s Note: Reductive art is a term to describe an artistic style or an aesthetic, rather than an art movement. It is stripping down as a new way of seeing. Movements and other terms that are sometimes associated with reductive art include abstract art, minimalism, ABC art, anti-illusionism, cool art, and rejective art. Eric Kandel’s fifth book focuses on reductionism as the principle guiding an ongoing dialogue between the worlds of science and art.
While attending the Society for Neuroscience annual meeting this past fall, I came across advertisements for the release of *Reductionism in Art and Brain Science – Bridging the Two Cultures* and the opportunity to have it signed by the author, Eric Kandel. Arriving in Publisher’s row, I stood in a long line, a testament to the reverence the neuroscience community has for the Nobel laureate. By the time I got to the booth, the publisher was down to its last two copies, leaving many disappointed fans behind me.

Months passed before I carved out the time to read it. Not surprisingly, I was soon engrossed; Kandel is known for clearly communicating complex concepts, whether in a definitive neuroscience textbook (*Principles of Neural Sciences*) or wide-ranging forays into the interface of science, art, and culture (*Age of Insight*). *Reductionism In Art And Brain Science*, while more compact, is no less ambitious. Helping draw the reader in is the quality of the printing. The book has a solid feel and the pages are on high quality paper appropriate for the stunning images Kandel selects to help tell his story.

Coming into his narrative, I had a solid grasp of the neural principles of the visual system, learning and memory, and cognitive processing. I was, however, a near-neophyte when it came to art and art history. The author elaborates (or should I say reduces?) the relationship between how the human nervous system processes and perceives the visual world, while also highlighting the dramatic changes taking place in the world of art that began in the 19th century and continues today.

Kandel believes that photography was a disruptive innovation that threatened the realists who had developed extraordinary techniques to evoke in intricate detail a three-dimensional landscape or portrait on a two-dimensional canvas. The artistic response evolved rapidly, even within the lifetime of artists who adapted their styles to meet the challenge. The choice of art featured in each chapter complements Kandel’s clarity of writing and crystalizes the points he is attempting to make.

Joseph Mallord William Turner’s seascapes from 1803 and 1842 exemplify the origins of this perspective, illustrating some of the first attempts to replace detail with elements of abstraction to create even more evocative works of art. Another great set of illustrations features works of Austrian composer and music theorist Arnold Schoenberg as his approach to portraits evolves in the span of a single year.

One of the most satisfying parts of the book is the discussion of bottom-up and top-down processing of information by the nervous system. The evolution of visual systems that allow organisms as simple as insects and as complex as human beings to interact effectively with a dynamic, fast changing three-dimensional world in real-
time is simply astonishing. The near “hard wired in” systems that enable scanning an open field and tree line for predators and prey, or recognizing faces and facial expressions in one’s tribe or village, are crucial for survival. But as cortical regions developed and became more complex, the brain was also evolving the capacity to be curious, solve puzzles, and fill in the blanks when presented with incomplete information.

When confronting an abstract piece of art, the viewer’s nervous system is challenged to function in a novel way—to scan and assimilate visual information that does not add up to the kind of representational image it evolved to interpret, and to understand this information through one’s own lens and unique framework. This can certainly be frustrating—seemingly impossible, even—with some pieces of art, but as in many other situations, the nervous system can learn with repeated exposure and benefit from the mentorship of one who is more experienced. Kandel is extremely adept at explaining what seem unlikely connections—between discoveries in our understanding of the nervous system and how we perceive and react to our surroundings, and how artists were adapting and evolving to engage audiences in new and provocative ways.

The utility of reductionist approaches to both neural sciences and to the creation of visual art is well documented as the reader works through each chapter. Kandel draws on his own research using simpler systems in which to study fundamental processes of learning and memory, allowing for eventual reconstruction into complex systems of human cognition in both health and disease. On the artistic side, the creation of abstraction—breaking the visual world into its basic elements of line, light, form, and color—is discussed and fully illustrated. The cover art by Mark Rothko is just one example of this component.

That Kandel’s book made me a more open-minded and curious viewer of art became apparent shortly afterwards, when I visited the Smithsonian American Art Museum in Washington, DC. with my teenage children. I sought out specific pieces in the collection and spent more time with those pieces than I would have otherwise. The adventure was enhanced by listening to my kids’ comments and observing their level of engagement and patience in each section of the museum. I did my best to explain some of the historical context and interpretation I had gleaned from the book and apply them to the exhibits.

A good book is memorable while a great book makes you think differently about a topic and perhaps change a behavior or apply what you have learned to a new challenge. I found myself excited to engage with both fellow neuroscientists and artists within the university faculty—thanks, in part, to my newfound enthusiasm for the topic and for sharing the experience of reading the book.
But another question has developed over the past few months, as I have gone back to reread sections of the book and view and revisit more of the artwork. It crystalized in a discussion with scientific colleagues. What value do members of the lay public perceive in a reductionist’s understanding of learning and memory when a parent has dementia? How is that piece of abstract art going to help me afford college for my child or enhance his or her education?

One response is to offer a foothold for understanding science and the arts to a broader swath of the public. As people experience new things and gain confident familiarity with the topics they represent, this enhances rather than stifles their curiosity. Inviting people into these fascinating fields and giving them a sense of how they bleed together to spark innovation and address complex problems is another of the book’s significant contributions.

We desperately need more authors like Kandel—thinkers who can master a discipline, move comfortably between the arts, sciences, and cultures, and communicate effectively with the public. We need scientists, artists, and scholars willing to engage with people without college degrees, children in diverse school systems, and policy makers who all too often hold too narrow a view of the world. Kandel has done a masterful job in “bridging the two cultures” of art and science through a reductionist approach. He also opens the door for us to build back up to the level of the individual, the family, and, the community. This may in fact be a viable approach in which to form new bridges across cultures that are isolated and deeply divided. These are doors we need to enter, and through his writing, Kandel demonstrates how science and art can be catalysts for positive change.

Bio

Ed Bilsky, Ph.D., is the provost and chief academic officer at Pacific Northwest University. He is a neuropharmacologist by training, having spent the last 30 years studying the neurobiology of opioids and opioid receptors, and their connections to pain, substance use disorders, and other complex behaviors. He is a National Institutes of Health funded professor of biomedical sciences, author of more than 80 peer-reviewed publications, and frequent speaker. He is passionate about higher education, student centered research and scholarship, and engagement with K-12 school systems and the public on important health issues involving the nervous system. He is a member of the Dana Alliance for Brain Initiatives and a committee member for the public education and communication committee of the Society for Neuroscience.