

ERIC KANDEL (2016). Reductionism in Art and Brain Science: Bridging the Two Cultures. New York: Columbia University Press.

Eric Kandel (2016), a neuroscientist who received a Nobel prize in 2000 for his work on the neurobiology of learning and memory. Kandel argues that abstract artists used reduction in their work to stimulate imagination and curiosity and thus to generate emotional, expressive, and conceptual responses and interpretations on the part of viewers. The artists encouraged individual interpretation, subjectivity, personal affective, cognitive and visuomotoric responses. They did this through the use of geometric shapes, color, line, and light. But we have to remember that their works were not just academic studies of form, color, line and light. They were also attempts to produce something beautiful, something artistic that would transcend the basic components of the work. It would appear that there may be an element of emergence in abstract art. By focusing on the basics of form, line, color, and light, the artists were striving to produce something that would transcend the basics and that would be aesthetically valued by viewers with diverse interpretations.

The brain scientist, on the other hand, has a different goal. The scientist wants to discover the biological mechanisms that subserve various functions. Kandel's goals were to discover the biological substrates for memory and learning. Thus, the reductionism in brain science, particularly through the use of rigorous experimental procedures, is engaged in order to learn the structure and function of mechanisms at the molecular, synaptic, and neuronal levels, in order to find (illuminate) universal facts, not personal responses and subjective understandings.

Thus, abstract art presents the artist's subjective vision and state of mind. It generates a mental state in the viewer and allows personal understandings by that viewer. But in brain science the researcher does not try to represent his or her inner vision if it can't be shown to conform to physical reality.

It is interesting that "reductionism" is used for two different and opposite purposes in brain science and an art: In brain science the researchers seek facts, objectivity, unambiguous answers where personal interpretation should not be unnecessary. In abstract art, the artist is seeking and encouraging subjectivity, personal interpretation, indeterminate perspectives, emotions, spirituality, and transcendence. Why is reductionism successful in art? Kandel argues that "abstract artists of the New York School succeeded in REDUCING the complex visual world around us to its essence of form, line, color, and light" (177). We might paraphrase this in the following new way, abstract artists succeeded in ABSTRACTING the visual world around us to the essences of form, line, color, and light. But note that here we move into a semiotic distinction between reduction and abstraction.

Kandel also notes that such abstract art can induce a "sense of spirituality." Is spirituality material? Here, in Kandel's terms, spirituality is generated by a viewer's brain when beholding the physical painting. So, the spirituality comes out of two physical sources--the brain and the painting. Does that make spirituality material or does it simply describe what the human brain can do – produce immateriality from reductionism in physicality.

Based on Kandel's observations, we might argue that abstract art has the ability to elicit the nonmaterial. Of Pollock's work, he says the action painting doesn't require an EXTERNAL framework of knowledge. Could we also say that it doesn't require a MATERIAL framework of knowledge. It requires movement, action, paint, and a talented artist. On these things, the viewers can project their own interpretations, imputations, aspirations aspirations, feelings, and associations onto the work and sometimes experience a spiritual uplifting. All this is done by physical entities, but is the spiritual uplifting more than simply the senses and relevant brain processes. Is spirituality material/physical? Wikipedia offers the following:

“Surveys of the definition of the term, as used in scholarly research, show a broad range of definitions<sup>[10]</sup> ranging from very narrow and uni-dimensional definitions such as a personal belief in a [supernatural](#) realm<sup>[5]</sup> to broader concepts such as a quest for an ultimate/sacred

meaning,<sup>[7]</sup> transcending the base/material aspects of life, and/or a sense of awe/wonderment and reverence toward the universe.”

"A personal belief in the supernatural realm" and "a quest for an ultimate/sacred meaning, transcending the base/material aspects of life." are two aspects that seem to include the nonmaterial/the nonphysical. "A sense of awe/wonderment and reverence towards the universe" might be considered a reference to the material/physical. But are the concepts, awe/wonderment physical? (See the discussion of Gallagher et al, this volume).

We are left to interpret Kandel's use of the word "spirituality" in the same way we are left to interpret abstract art. Kandel, by considering brain science and art together, creatively integrates the symbolosphere and the biosphere, and in the process the biosphere inherits some of the ambiguity of the symbolosphere. This is a non-reductionist creative move that is needed in order to "bridge the two cultures".

Kandel discusses the default network in brain processing and suggests that this network is related to the issues of self and identity. One might also speculate that the default network may contribute to our brains ability to create and process abstract nonphysical entities. Our identity is protean.

We often project ourselves into the future and imagine an identity at that time. In Deacon's (2012,2013) terms, the future self is an absential and to the extent that absentials can be nonmaterial, one's self identity in the future is nonmaterial/nonphysical, but this absent non-physical entity can influence our brain, body and behavior with respect to achieving that identity.

Kandel cites the New York art critic, Nancy Princenthal, in a discussion of abstract art as saying, "To be abstracted is to be at some distance from the MATERIAL [my emphasis] world." (185) This suggests some abstractions may not be material. The work, the products of abstraction in the art of abstract artists, may refer to the nonmaterial world via the material painting.

## A Return the Two Cultures

Kendell notes that in the 1950s, after the discovery of the structure of DNA, the unification was begun among the fields of biochemistry, genetics, immunology, development, cell biology, cancer biology, and molecular neurobiology. HJe would like to see a similar unification among brain science, art, and the humanities. He believes a dialogue is already possible and, indeed, is underway by a people interested in the integration of these three areas.

But we should take into account the fact that the arts and humanities are in the world of the symbolosphere, and they work differently from the biosphere and the physiosphere.

This biosphere is a universe of sign-sign and symbol-symbol relationships. Words (as signs) get their meaning through their referential relationships with other signs. Symbols (in the Peircean sense) do not refer to things in the world (as icons and indexes do). They refer to other signs (e.g. words) and great webs of words.

The brain is degenerate in the sense that many structurally different regions and networks can produce the same output. The lexicons of human languages are also degenerate. They contain synonyms that are words that are spelled differently but have the same or similar meaning. The brain is also pluri- potential; the same region or network can produce very different outputs. In language, words can be polysymous; the same word can have different meanings (Schumann, 2017). This situation introduces a great deal of ambiguity and imprecision into language, and this fact is recently being confronted by neuroscientists.

Additionally, as Kandel has shown in his book, abstract art, and we might say, the arts and the humanities in general bring forth and encourage interpretation, subjectivity, speculation, and personal appraisal based on variation in cultural values and individual temperament. The

sciences, of course, are interested in precision, fact, universal truths, irrefutable evidence and conclusions.

I don't believe these differences will go away or be resolved through the process of conflict and resolution. The human ability for symbolic reference has allowed the physical brain to create a process nonphysical ideas, idealizations, ideologies, concepts, and conceptualizations. In order to bring about a unification between brain science and the arts and humanities, we have to recognize the symbolosphere as a separate entity from the biosphere and the physiosphere from which it comes. This symbosphere has to be understood in its own terms. We have to understand how the symbolosphere was generated by biological human brain interacting with languages that are, in many ways, imprecise, ambiguous and, at the same time, flexible and extremely efficient and effective for communication and thought.

We can't see the arts and humanities as simply quaint remnants of a prescientific world that now must yield to science the role of discovering the truths of the universe. At the same time, we have to recognize that, in some way, which is not fully understood, the arts and the humanities come out of human brains and have never lost their connection to them. Like Kandel, we have to understand these connections to fully understand the arts and the humanities. At the same time, we can't expect to achieve an eliminative reductionism in which understanding the neural basis for the arts and humanities will be sufficient. Even when we come to completely know the neural basis for love, love stories will continue to be written.

*Reductionism in Art and Brain Science* is a wonderful book. Like the arts and humanities, it is designed to make one think. Kandel's association between abstract art and reduction in science makes a basic association between two highly symbolic signs "abstraction" and "reduction". The question now is not whether this association is correct or wrong. The question is what the association has opened up for us. Kandel has painted a picture. If we were to hang it in a gallery with other paintings, would we ask which one is correct? I don't think so. The question would be "How is this painting relevant to me? "

There are several avenues for future study of the neural substrate for the production of the nonphysical symbolic world. An alternative, of course, these just to dismiss the notion that there is anything nonmaterial in the world, but we need would want to be certain that such a strong physicalist approach is not just an ideological stipulation based on a preference. The only way to do that is to maintain and explore the possibility of a nonphysical sphere of our existence.

Thomas Nagel (2012), a philosopher at New York University, also takes a nonphysicalist view of aspects of mental life. He notes that while physics and biology have made great contributions to our knowledge of the material world, he questions whether science as developed to explain that world can adequately provide and understanding of aspects of our mental lives such as consciousness, meaning, intention, purpose, and more generally subjective experience. He suggests that physical science will have to expand its theories to include mental phenomena. I would also suggest that perhaps the nonmaterial elements of the symbolosphere (and thus the mind) they simply do not yield to the scientific analyses that physics, chemistry, and biology engage. The symbolosphere, by its very nature as a level of our existence, cannot offer the certainty, the finality, the lack of ambiguity, and the final answers that science ultimately demands and therefore seeks. In the symbolosphere, questions are more important than answers because in the symbolosphere there are very few final answers.

## References

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