

Essays On The Nervous System: A Festschrift For Professor J. Z. Young



Neurobiology and the Humanities

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<http://dx.doi.org/10.1016/j.neuron.2014.09.016>

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Can the arts and humanities contribute significantly to the study of the brain? Similar brain processes are involved in humanistic and scientific inference, and in this essay, I argue that conclusions reached by one are relevant to the other.

Can the arts and humanities contribute significantly to brain studies? Do they frame questions regarding human experience that can be tested experimentally and are these fundamentally different from those posed by neuroscience? Is there any present need or imperative to appropriate questions from them in neurobiological studies, or should that be deferred until more is known about the functions and functioning of the brain? These questions impose themselves forcefully at a time when a significant proportion of human brain studies are addressing questions that are of importance to human experience.

Common Questions

Science and the humanities have much to separate them but much in common too. Artistic and scientific questions are commonly the same, though addressed differently, and hence, the former provide hints and guesses for scientific experimentation. I have written of artists and humanists as being, in this sense, neurobiologists who explore the brain, though with techniques that are unique to them (Zeki, 1993). Paul Cézanne's preoccupation, and artistic experimentation, with how color modulates form is but a variant of the neurological question of how the separate representations of form and color are integrated in the brain to give us a unitary percept of both (Zeki, 1978; Livingstone and Hubel, 1988). The experiments of Picasso and Braque in the early, analytic, phase of cubism—of how a form maintains its identity in spite of wide variations in the color in which it is viewed—resolves itself scientifically into the neurobiological problem of form constancy. The quest of Piet Mondrian for the “constant truths concerning

forms” (Mondrian, 1947) is an artistic version of the question of what the neural building blocks of all forms are (often presumed to be the orientation-selective cells of the visual cortex), while kinetic art, which sought to represent motion artistically, reached conclusions that are consistent with conclusions reached later by neurobiology (Zeki and Lamb, 1994).

All Truths Are Subjective

These are, in a sense, false rallying points that merely serve to emphasize different approaches to what are, at heart, common questions. More difficult to address are shared questions regarding human experience and what they signify about brain operations and the world in which it has developed. Here the boundary between neurobiological and humanistic questions is faint and separating the two, I believe, does both a disservice even if, at present, the relationship between neuroethics and the humanities is asymmetric, in that neuroethics has a good deal more to gain from the humanities than the latter from us. Many of the critical questions now addressed experimentally by neuroethics have been addressed in philosophical discourse for centuries. Prominent among these is the problem of knowledge, a primordial function of the brain and a central issue in philosophy. Using color vision as an example, Arthur Schopenhauer argued that “a more precise knowledge and firmer conviction of the wholly subjective nature of color contributes to a more profound comprehension of the Kantian doctrine of the likewise subjective, intellectual forms of all knowledge” (Schopenhauer, 1854), since color is a subjective experience that is the result of a transformation of the objective reality of the outside world

by rules that govern the operations of the mind (brain). The only knowledge we can therefore have of color is “brain knowledge”. The brain, far from representing colors (or indeed the sensory world) passively and veridically, constructs them through inherited programs (algorithms) (Zeki, 1993). Neurobiology has yet to unravel the details of these operations, but their purpose is to stabilize the colors of surfaces in spite of continual fluctuations in the wavelength-energy composition of the light reflected from them, leading to a constancy of colors. While we can be (subjectively) sure that a leaf is green even when it reflects more long-wave (red) light (as is common at sunset or sunrise), we can never be sure, unless armed with light-measuring devices, of the “objective” reality in terms of the precise wavelength-energy composition of the light reflected from a surface and from its surrounds. Generally speaking, the only truths that we can be certain of are those that we experience, namely subjective truths. This is but one example of a shared general question in neurobiology and the humanities—of how objects and situations maintain their identity in spite of continual changes in the signals reaching the brain from them, summarized for Western philosophy in the Heraclitan doctrine of flux and for Eastern (Buddhist) philosophy in the statement that “nothing is permanent except change.”

Similar Inferential Processes in Scientific and Humanistic Approaches

The primacy of subjective truths extends from an apparently elementary process such as color to much more complex experiences, such as those of beauty,

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