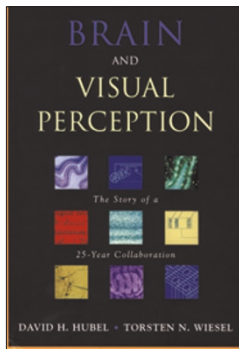


Functional interactions of a scientific collaboration



Brain and Visual Perception: The Story of a 25-Year Collaboration

by David H Hubel and Torsten N Wiesel

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Reviewed by Andrew J Parker

Brain and Visual Perception is an elegantly presented and well-organized collection of critical and important papers from the 25-year collaboration of Hubel and Wiesel. The writing is interspersed with informal observations, almost exclusively written by Hubel, about the motivations, thoughts and afterthoughts surrounding these experiments. The aim has been to convey the atmosphere and personal interactions associated with their research and to illustrate how their early scientific development shaped the collaboration and possibly even led to its ultimate fission. Fascinating though these commentaries are, they must be understood as a present-day perspective on events rather than a contemporary record of what happened. As such, for any future historian of science, they will be the starting point for inquiry rather than an answer to the question of what really happened.

The 'slightly less than young' reader should be warned against looking at the official bibliographic classification of this book, where two of the three main categorizations are 'Biomedical Research—History' and 'History of Medicine, Twentieth Century'. This is certainly a sting for anyone who has grown up with these papers.

Indeed, the book arrived for review as I tidied up from last year's teaching; the early papers from Hubel and Wiesel were there, with the long 1962 paper lying next to the 1959 paper, which introduced orientation selectivity as a property of visual cortical neurons. Among this bundle also lives the 1966 paper from Enroth-Cugell and Robson, describing the first use of sinusoidal visual grating patterns to investigate the cat retina. This paper must be the serpent in the garden of Eden in Hubel's view, simply because of its use of sinusoidal gratings and linear systems analysis. This is the kind of controversy that draws readers to the commentaries to gain further insight. Here, the book is enormously helpful in helping people to relive these debates at first hand.

It is remarkable that a burning dispute could be set alight by this difference in methodology. Both papers arose from honest and valid attempts to develop concepts from the pioneering work of Hartline, Barlow and

Kuffler. For example, both correctly claim to better define the visual receptive field of neurons; both use an explanatory framework in which the visual receptive field may be divided into regions, in some of which the presence of light causes the neuron to fire more action potentials, whereas in others light suppresses firing; and both consider that these regions are mutually antagonistic, so that excitation generated within one region can be cancelled by the suppressive effect of another. The 1959 Hubel and Wiesel paper is a classic teaching tool for introducing these concepts; it is always an interesting moment when students, who have read only textbooks, confront Figure 1. Here, they realize it is not obligatory to use an oriented bar or edge stimulus to reveal the orientation selectivity of a V1 simple cell, even though the commentaries tell us that this is how the property of orientation selectivity was first discovered. Finally, the 1962 Hubel and Wiesel paper and the 1966 Enroth-Cugell and Robson paper both break this model by identifying types of neuron (complex cortical cells and Y-type retinal ganglion cells respectively) that fail to conform to the earlier conceptions.

Other themes run through the commentaries: for instance, Hubel's conscious repudiation of all forms of administration and Wiesel's willingness to undertake it, at least later in his career, particularly to give opportunities to younger scientists. However, the most striking comment for anyone, already working in the field or aspiring to do so, is the difference in the nature of scientific writing between now and 40 years ago. Hubel thinks that reading modern papers is like 'eating sawdust'. This comment provokes a lot of thought (and not a little defensiveness) as to the reasons for such a difference.

One issue must be the increased demand for quantification of results, which is surely a good thing. However, another issue is that, when the early papers were written, they were still the main method of communicating with other scientists. Meeting face to face was difficult: one colleague said that to transport him and his family by air to the USA at that time cost no less than three months' salary. So papers themselves had to fulfil the present-day roles of conference presentations, talks, seminars and Internet chit-chat, as well as an archival written record.

Just how the audience for papers differs is illustrated by the anecdote from the editor of the *Journal of Physiology* who dealt with the 1962 paper. The paper arrived close to a university vacation, and the editor realized that it would not be easy to find referees for it. Accordingly, as he was about to disappear on holiday himself, he decided he would simply read through the paper overnight; he had no background in vision, although he was a neurophysiologist. By the next morning, he had decided that it was clearly a very important paper, so without being deeply concerned about whether he had grasped all the detail, he accepted the paper without further editing. Such, I assume, is the version that we read nowadays.

This is a valuable volume. Librarians will want to acquire it, as it will save finger marks on bound journals and the 'razoring out' of journal pages by modern-day bounty hunters. Scientists will want it because, whether or not you like the commentaries, you have to admit that they are fascinating reading in themselves. Will it replace my reprint collection? Probably not. Although it is far too early to consign these papers to the category of history, there is a great deal of the historic about them, which is best grasped by handling a venerable photocopy of rather poor quality or diving back into the original leather-bound volume, even if it does annoy the librarian. ■

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