EVOLUTIONS
BARBARA L. FINLAY

Born in 1950 in Pittsburgh, Pennsylvania. B.A. Oberlin College, 1972. Ph.D. Massachusetts Institute of Technology, 1976; Assistant Professor, Department of Psychology, Cornell University, 1976–82; Associate Professor, 1982–88; Professor, 1988– ; Chair, Department of Psychology, 1996–2001; Visiting Scientist, Oxford University, 1984; Honorary Visiting Fellow, School of Anatomy, University, of New South Wales, Australia, 1986; Visiting Scientist, "Cerveau et Vision", INSERM, Lyon, France, 1995; Visiting Scientist, University of Pará, Belém, Brazil, 1996– ; Distinguished Visitor, University of Western Australia, 2002. Editor, *Behavioral and Brain Sciences* 2002–; Editorial Boards: *Brain, Behavior and Evolution*, 1995–2002; *Visual Neuroscience*, 1995–98. Publications: "Developmental Structure in Brain Evolution", with R. B. Darlington and N. Nicastro. *Behav. Brain Sci.* 24 (2001). "The Cortex in Multidimensional Space: Where Do Cortical Areas Come from?" with M. A. Kingsbury. *Dev. Sci.* 4 (2001). "Linked Regularities in the Development and Evolution of Mammalian Brains", with R. B. Darlington. *Science* 268 (1995). – Address: Uris Hall – Department of Psychology, Cornell University, Ithaca, NY 14853-7601, USA.

My fall stay at the Wissenschaftskolleg coincided with the beginning of my new position as editor of the journal *Behavioral and Brain Sciences* (BBS) as well as being a time for synthesis of some general ideas about the nature of brain evolution that I have been developing. The undisturbed time at Wiko was an excellent environment for both, as well as for the intellectual interaction afforded by the brain evolution focus group. I will discuss these topics separately.

Journals

It is a challenging time to take over a prominent journal. The type of evidence I will present that BBS is in fact a "prominent journal" is one source of the challenge. For the year 2002, BBS's "impact factor", a measure of the citation frequency of the journal computed by the Institute for Scientific Information, placed it first of 39 behavioral science journals and ninth of 197 neurosciences journals. BBS publishes particularly significant and controversial pieces of work from researchers in any area of cognitive science, which can be anthropology, economics, computer science, behavioral biology, psychology, neuroscience, or philosophy. Published together with the article are 20–30 commentaries on each article from specialists within and across these disciplines, plus the author's response to them. Within these wide-ranging disciplines, the content of articles is very eclectic. Some sample titles of manuscripts I dealt with from the time I was at Wiko give an idea of this range:

- The evolutionary origin of the mammalian isocortex: Towards an integrated developmental and functional approach
- Three stages in the evolution of cruelty: Predation, hunting, and power
- Self-experimentation as a source of new ideas: Ten examples about sleep, mood, health, and weight
- Separate visual representations in the planning and control of action
- What to say to a sceptical metaphysician
- *Foundations of language* (multiple book review)

Widespread attention to impact factors is a relatively new phenomenon that has changed the nature of scientific publishing. For academic tenure, promotion, and grants, publication- and citation-counting have been commonplace for years, but a substantial qualitative component existed in the interpretation of these data in the estimation of the quality of the journals published in. While a qualitative judgment should certainly remain, in fact, in many venues, judgment has been all but replaced by the impact factor, often used as a simple multiplicative factor on the citation itself; this is the specified procedure for tenure and grant assessment in a number of countries and granting agencies. For example, by this metric, an article in *Science* would be valued about 6 times as much as an article in any of the 150+ neuroscience journals of record. The effect has been immediate and direct: submissions to high-impact journals are up, submissions to the others are down; anxiety and

efficiency are up; whimsy and many aspects of gentility are gone; eclecticism is challenged. This new cauldron makes a different stew; it also changes the cooks who stir it.

Most important for BBS's purpose as a journal of controversy and consideration, the time frame in which authors expect action is markedly changed. BBS's impact factor benefits from the use of citation indices in that our review and commentary process virtually guarantees that any article gets closely read by at least 40 readers, all of whom are potential citers (the median number of citations of scientific papers generally is, unfortunately, 1!). A journal like BBS does not benefit at all from mind-blinding speed, but such speed is all but required from the ambitious scientist, particularly those who receive funding from biomedical sources. The challenge for an editor in this environment is to make explicit for herself the consequences of what might seem to be minor decisions of the type of how long a reviewer is given to review for the submissions and readership of a journal – not to blindly follow pressure and exigency.

BBS was one of the very first all-electronic journals (for submission and review), and Stevan Harnad, the first editor and inventor of BBS, developed the Open Peer Commentary format together with the electronic medium that uniquely suits it. Technology now makes it possible for us to considerably elaborate and extend the commentary format, which we choose to do. This would seem highly desirable, to have the opportunity to participate in a mediated forum of the highest quality. While this forum might have impact, it has no impact factor. This is a problem.

I suspect that discussions of the problems of contemporary journals appear infrequently in the Wissenschaftskolleg's yearbook. It should be obvious, I hope, that consideration of the properties of the scientific publishing environment is critical to the progress of science, and Wiko did provide the congenial atmosphere for this type of consideration.

Science

Brain development and evolution is my field of interest and was also the interest of the group convened by Georg Striedter. I continued work on a number of papers, most of which are still in progress. Collectively, the papers all concern a clash of interpretation about "levels of analysis" in describing evolutionary phenomena. The motor of biological change is successful adaptation; only those who survive pass on their genes. But to describe the structure of change, history matters – adaptation must be described in the context of the prior state of the species and the constraints and possibilities of the developmental

mechanisms available to resculpt an organism. Much has also been written about just what counts as an "adaptation", especially in the context of development. One example in brain evolution:

The classic picture of the human brain shown in talks and printed media depicts the cerebral cortex in side view, often with description added: a number of cortical areas, each with a function given. It's not unfair to say that the Holy Grail of work on the neural basis of human cognition has been to understand the "cortical area" – what each area does, how each area got there, considering both development and evolution. But what if cortical areas don't really matter for understanding the structure of cognition and we have simply been overimpressed with a superficial feature of organization? Consider a beehive (this example taken from Jeffrey L. Elman. *Rethinking Innateness: a Connectionist Perspective on Development.* MIT Press, 1996). Each cell of a honeycomb is hexagonally shaped, but there are no explicit instructions for the production of hexagonal structure in the bee's construction of a cell. Hexagonal shapes emerge through the simultaneous construction of several cells packed into a small area. While hexagons have nice features for efficiency of packing (as cortical areas probably do), we have no reason to believe that construction rules that produced little cubes or slightly more amorphous blobs instead would render a beehive nonfunctional. The scientist who devoted his life to the understanding of hexagonal structure, if that scientist was truly concerned about describing functional adaptations, may have devoted his life to the explanation of an attractive-looking artifact. I argue that an understanding of both function and development is required to discriminate an adaptation. The information that links special functional status to cortical areas is weaker that formerly thought, and "areas" are a manifestation of a very powerful ordering-and-segregating developmental process that produces local-to-global order from neighboring synapses on up. These types of arguments form a theme through a set of five papers presently in various stages of completion, all of which were touched on during my stay at Wiko (listed below).

Overall, I have been given the opportunity to consider both the content of science and the means of its communication, an interesting enterprise indeed.

Titles of Publications in the Works

Finlay, B. L., B. E. Clancy, and M. A. Kingsbury. "The Developmental Neurobiology of Early Vision." In *Advances in Infancy Research*, edited by S. P. Johnson and B. Hopkins, 1–42. Ablex Press, 2003.

Finlay, B. L. "The Calvinist Cortex: Penetrating Evolutionary Predestination." Commentary on B. Merker. "Cortex, Countercurrent Context, and Dimensional Integration of Lifetime Memory." *Cortex* 40 (2004).

Finlay, B. L. "Cortical Brain and Behavioral Development." In *Cambridge Encyclopedia of Child Development*, edited by B. Hopkins. In press.

Finlay, B. L. "Rethinking Developmental Neurobiology." In *Beyond Nature-Nurture: Essays in Honor of Elizabeth Bates*, edited by M. Tomasello and S. Slobin. Lawrence Earlbaum Publishers. In press.