



## BOOKS: COGNITIVE SCIENCE

## Into the Minds of Babes

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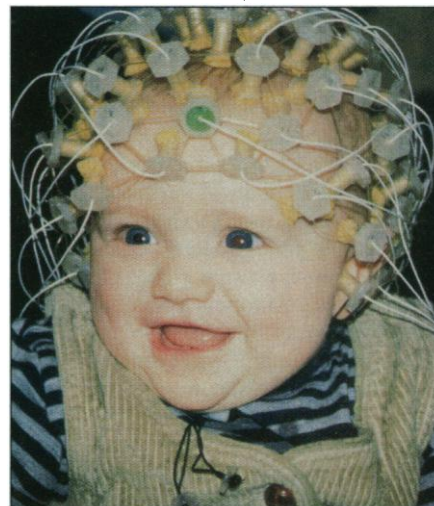
In April 1997, Bill and Hillary Clinton hosted a conference at the White House entitled "Early childhood development and learning: What new research on the brain tells us about our youngest children". This gathering, one of several held around the same time, attempted to translate our current scientific knowledge of early brain and cognitive development into social policy. Two invited attendees, John Bruer and Patricia Kuhl, have now written books (Kuhl in collaboration with Alison Gopnik and Andrew Meltzoff) that use the White House meeting as a springboard.

John Bruer, president of the McDonnell Foundation (which supports research in neuroscience and cognition), carefully analyzes the relation between the science and the political rhetoric. He argues that the only substantive link between the two is the lunch at the White House. Specifically, Bruer attacks "the myth of the first three years," which has been advanced by some of those involved in social policy, writing, and journalism. This is the view that providing children with an enriched educational and social environment for their first three years will result in long-term beneficial effects, such as higher intelligence and reduced crime. Several strands of scientific evidence have been used to support this claim: First, during infancy there is a period of "exuberant" production of synapses, before a "pruning" phase reduces the number to those seen in adults. Second, there are critical periods in brain development during which the brain shows a greater plasticity in responding to experience. Third, different environments during rearing can affect synaptic density in certain brain regions. These three strands have been woven together (often by non-scientists) to produce claims that during infancy the brain's exuberant connectivity makes

them uniquely sensitive to "enriched" experience. Equivalent input at later stages is assumed to be less valuable because the critical period is over. Therefore, the argument goes, we should invest more resources in education and child care during the first three years.

Leaving aside the possible merits or shortcomings of this social policy, Bruer points out that closer inspection of the scientific evidence does not support the myth. For example, most of the studies of the effects of "enriched" environments on the developing rodent brain are better interpreted as comparisons between a normal environment (with its complexity and richness) and the deprived environment of laboratory cage rearing. That is, the effects are due to deprivation rather than enrichment.

I suspect that most developmental neurobiologists and psychologists would agree with Bruer's conclusion that the current state of our scientific knowledge of early development does not yet provide the basis for social policy recommendations. We need, however, to be careful not to throw the baby out with the bath water, in several respects. First, although there is currently no evidence for positive effects of early "enrichment," there is also no evidence against them. Rigorous research on early development still needs to be conducted (and funded). Second, and related, part of the reason for the existing distance between educational policy and developmental neuroscience is that most of the latter is conducted on animals. As Gopnik, Meltzoff, and Kuhl point out, there are now techniques for studying the workings of children's brains that offer hope for developing a proper neuroscience of human learning. Third, even though we are unlikely to be able to substantially improve on the ability of the normal environment (in which we have evolved) to promote optimal brain development, in cases of abnormal development it is less likely that the normal environment is ideal. For developmental disor-



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ders, early diagnosis and intervention may be more valuable than leaving such actions until later in life.

Gopnik, Meltzoff, and Kuhl, who are all leading developmental psychologists, provide an altogether more positive view of the current state of research on the development of infant minds and brains. Their book, which is delightfully written for a wide and non-expert readership, addresses some of the same issues as Bruer's, but from a very different perspective. They highlight three domains in which the computational mind of the infant develops in interaction with its normal and complex environment: people, things, and language. The trio views children partly as little scientists (creating and revising theories about the world in which they live) and partly as biological computers (but able to rewire and reprogram themselves).

Although Gopnik and colleagues agree with Bruer that current knowledge does not provide us with a recipe for creating "superbabies," they do have a different perspective on sensitive periods. When the infant's brain learns something, they argue, it is then in a different state to select and process new experiences. In other words, learning things in the right sequence is vital. By this view, the first three years are crucial—not because of the closing of maturational windows, but because what is learned during that interval provides the foundation for all subsequent learning and experience. Fortunately, parents can be assured that the normal social and physical environment in which they raise their infants is the very one for which their children are best adapted.

**The Myth of the First Three Years**  
A New Understanding of Early Brain Development and Lifelong Learning  
by John T. Bruer  
Free Press, New York, 1999. 256 pp. \$25, C\$37. ISBN 0-684-85184-9.

**The Scientist in the Crib**  
Minds, Brains, and How Children Learn  
by Alison Gopnik, Andrew N. Meltzoff, and Patricia K. Kuhl  
Morrow, New York, 1999. 299 pp. \$24, C\$35. ISBN 0-688-15988-5.

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