Journal of Philosophy of Education, Vol. 42, No. 3-4, 2008

1. BRAIN-BASED LEARNING
Introduction

Issues surrounding the growing importance of what is sometimes referred to as 'brain-based learning' span both empirical and philosophical debates. All but one of the contributors to this section have a background in empirical research. The exception, David Bakhurst, is first and foremost a philosopher. Nevertheless, all of them offer insights into the complex interrelationships between the sciences of the brain and mind on the one hand, and philosophical accounts of the mind on the other.

Contemporary opinions about the importance of cognitive neuroscience for education vary wildly—from the idea that neuroscience has the potential to solve many important challenges currently faced by educators, to the sceptical view that biological research is largely irrelevant to our understanding of learning.

Usha Goswami sketches some important fundamental facts about neurological development, following this with an illuminating survey of what she sees as current research questions that span cognitive neuroscience and the study of learning. She covers four headings: neural structures for learning, the interconnections between neural structures, studies about the timing of neural activity which help us discover what neural structures are implicated in particular types of cognition and the topic of neural correlation versus causation. She proceeds to note worries about 'neuromyths'—that is, overblown claims made about brain-based learning. Such exaggerated stances are often taken by self-styled educators on the fringe of neuroscience, rather than by academically respectable scientists.

At the heart of her paper is a summary of learning principles which she feels are robustly supported by empirical research. These, she believes, 'can be incorporated into education and teaching'. She contends that learning is incremental, experienced based, multi-sensory, that brain mechanisms involved in learning 'extract' structure from experience even when that structure is not directly taught, that learning is social, that the crucial importance of emotions in learning is explicable at least in part in evolutionary terms, and that 'it is never too late to learn', given what is now known about the plasticity of brain functioning. She ends by noting that we should be able to identify 'neural markers' to help educators to intervene with pupils especially at risk of encountering learning difficulties. Neuroscience can also help us, she argues, to maximise the efficiency with which the brain learns. She is fully behind the goal of crossing disciplinary boundaries—e.g. of biological and cultural studies in order to develop a 'truly effective discipline of education'.

Paul Howard-Jones, though writing from an empirical research orientation, ventures into the complex intellectual territory that forms

the interface between neuroscience and other educational approaches to learning. He examines claims made by some philosophers that certain attempts to draw on neuroscience to further our understanding of learning 'stray beyond the bounds of sense'. Well-known recent proponents of such claims are Bennett and Hacker (2003). Howard-Jones compares accounts of learning offered by neuroscience with those generated from disciplines more traditionally associated with education, following this with a critical discussion of the tensions between these two perspectives. His account of cognitive neuroscience focuses on an effort to understand the interrelations between mind and brain. He argues that there need be no conflict between contemporary neuroscientific thinking about learning, and those social sciences emphasising social and cultural factors. Concerns about the *free will* or otherwise of the learner are the focus of a final section. He concludes by emphasising the importance of attending to the philosophical issues 'within and between' neuroscience and education.

Zachary Stein, Michael Connell and Howard Gardner's paper covers a wide range of issues, but for the purposes of this section I concentrate on their treatment of neuroscience and education. They emphasise the need for an interdisciplinary synthesis when dealing with key educational issues, and draw attention to what they see as past failures to achieve this. They cite the collaboration of a neuroscientist with a philosopher (Changeux and Ricoeur, 2000). The two participants have, in the view of the authors of this paper, allegiances to 'two radical distinct viewpoints', namely the scientific perspective on the one hand, and a preoccupation with meaning and value on the other. The result 'is disciplinary ships passing in the epistemological night' (this issue, p. 402).

Their support for an interdisciplinary synthesis is explored further through the example of numeracy. We can study this, the authors tell us, by means of a variety of perspectives, including both neurones in networks, and symbol systems in societies. Developmental dyscalculia is due, on their account, to unusual brain phenomena, which in turn suggest genetic causes. They are also clear that culture impacts significantly on the way such a disability manifests itself. There are 'tensions' between the scientific account and the cultural story. They proceed to speak eloquently of the value issues surrounding the diagnosis and treatment of learning disabilities, pointing out the possibility that 'abnormal' brain states, once postulated, might lead educators to aim at 'normal' states. Such a move arguably sidelines some crucial normative questions.

David Bakhurst draws on his extensive knowledge of Soviet philosophy to reflect upon and illuminate the murky relationships between brain science and notions of mind and person. He evaluates the arguments of Evald Ilyenkov, who fought the influence of 'brainism' in education, a view which links students' capacities to learn with their brain functions, these in turn being strongly associated with genetic factors and the supposition of innate abilities. Bakhurst emphasises that there is much more than mere historical interest in these arguments, urging that 'the problems that exercised Ilyenkov remain with us, and in many respects we are no closer to resolving them' (this issue, p. 415). He contrasts 'brainism' with

'personalism'. According to the latter, it is the *person* who 'sees, hears, imagines, infers, speculates, hopes, intends, wants, reasons' (this issue, p. 418), rather than the brain. Bakhurst devotes much attention to evaluating some arguments for personalism. An educator strongly persuaded by personalism seems unlikely to appeal to neuroscience when seeking to understand the character of learning and how it might best be developed.

Bakhurst notes the relatively cautious claims made about learning by neuroscientists such as Blakemore and Frith, but also the less modest programs suggested by others, using so-called scientific authority. Ilyenkov would have been 'provoked', we are told, by Blakemore and Frith's entertaining the possibility that one day people might pop pills to learn.

Bakhurst defends Ilyenkov up to a point by drawing on John McDowell, and the idea that children learn to inhabit the 'space of reasons'. The thinking of such inhabitants is subject to *normative* rational explanations, which contrast sharply with the causal explanations appropriate to the natural sciences, including neuroscience. Bakhurst contends that brain science need not be restricted to explaining *limitations* in student learning, and opposes Ilyenkov's view that only social factors 'are relevant to the explanation of ability and achievement' (this issue, p. 425). However, he ends by urging that any enthusiasm for contemporary scientific advances should not blind us to the crucial role of *value* in education. This point echoes those made by many other contributors to this issue, including those writing about the enhancement agenda.