Book review:

Evolution of the Learning Brain or How you got to be so smart.

Paul Howard-Jones

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“Nothing in biology makes sense except in the light of evolution” (Dobzhansky, 1973). If we agree with Dobzhansky then it makes sense that, in order to understand the structure and function of the brain, we need to consider it in terms of evolution. Furthermore, given the central role of the brain in learning, it also makes sense that we try to understand how and why we learn in the context of our evolutionary development. In *Evolution of the learning Brain or How you got to be so smart,* Paul Howard-Jones attempts, very successfully, to provide us with such an evolutionary perspective on our ability to learn both individually and as a species.

In his accessible style he takes us on a fascinating journey of nearly 4 billion years of life on Earth. He highlights key examples of how organisms developed biological structures and processes that resulted in behaviours which might be described as part of ‘learning’. From, for example, the bacterium *E.coli* having a ‘memory’ of using particular chemicals for nutrition or detecting toxins; through the single-celled *Paramecium* being able to detect barriers and adapt its movement accordingly; to the network of neurons that communicate via chemical synapses in jellyfish and which influence its swimming patterns. The story continues with the development of the vertebrate brain originating with the jawless fish and retaining the so-called ‘tripartite’ structure (forebrain, midbrain, hindbrain) through to humans. Although, the underlying structure of the brain has been retained the relative size of the various parts has evolved as the environment has changed and new species have appeared. The key point is that the underlying biological mechanisms used by humans (and other animals) to detect, process and respond to information have been developed over a very long period of time.

Paul Howard-Jones moves almost seamlessly from an emphasis on physical changes in the evolution of the brain to considering the impact of increasing socialisation among primates and to the strengthening of co-operative activities leading to learning. He explores not only the modifications to the relative sizes and differentiation of brain structures but also the behaviours that have contributed to improvements in the learning of individuals and populations. The importance of cultural development through the use of language, the written word and numeracy forms a strong thread and has moments which made me stop and think, “So that is why <xxxx> happens.” or “I wonder if <xxxx>?.”. In short, I found it difficult not to reflect on my own understanding of the brain, learning and teaching. A particularly helpful feature throughout the book is the material given in ‘boxes’ providing explanations of particular ideas arising in the main text from neuromyths to brain mechanisms to underpinning principles of neuroscience. Indeed it would have been very useful to have had a list of the ‘boxes’ after the contents in order to be able to access them more readily – something for the reprint / second edition maybe?

One of the criticisms that is levelled at texts in this developing field of educational neuroscience is that they don't provide enough detail to have a direct practical application to the classroom. Such criticisms often go so far as to say that the neuroscience doesn't tell us anything that we don't already know from behavioural studies. This is not the place to debate the 'ins and outs' of this position but it is important to note that Howard-Jones acknowledges the challenge of relating the neuroscience findings to the classroom. In particular, he considers (page 160) three important elements of learning which teachers, especially, will recognise: engagement for learning; the building of knowledge; and the consolidation of learning. More importantly he puts our understanding of learning into perhaps the widest context we know – the evolution of life. Reading this book, not looking for a 'silver bullet' but rather testing the ideas against our personal knowledge, understanding of learning and experience, can be very revealing and rewarding. Not only does it inform and point to explanations for some behaviours, but it also challenges us to think about **why** some practices work and others don't (not simply that they work or not). In short, Paul Howard-Jones has provided us with a book which is extremely readable, provides an illuminating perspective on learning and offers much food for thought. It is certainly worth reading and is likely to become 'well-thumbed' as time goes on and it is referred to it again and again.

Review by Professor Derek Bell, Director of Learnus

Reference.

Dobzhansky, T., 1973 Nothing in Biology Makes Sense except in the Light of Evolution. *The American Biology Teacher,* Vol. 35, No. 3 (Mar., 1973), pp. 125-129.