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# Book Review

*The Evolution and Function of Cognition* by Felix Goodson. Mahwah, N.J.: Lawrence Erlbaum Associates, Inc. 2003. xxvi + 361.

Reviewed by Andy Lock

An evolutionary thrust in psychology began with Darwin and Romanes with their respective classics on the expression of the emotions (Darwin, 1872) and the evolution of mentality throughout the animal kingdom (Romanes, 1882, 1883, 1888), was maintained in comparative psychology through to the mid-20th century, and then practically died in the first cognitive revolution. Aside from Bruner and Piaget, influential figures associated with the classical computational model of the mind, such as Chomsky and Fodor, took the view that evolutionary theory was of scant importance to cognitive science. In the past decade or so, an evolutionary perspective has re-emerged in psychology as a programme that terms itself 'Evolutionary Psychology', associated with names such as Buss, Cosmides, Pinker and Tooby. This is, I suggest, an unfortunate appropriation to a relatively narrow set of concerns and claims about the nature of the 'human mind' of what should be a generic term for the application of evolutionary thinking in psychology. One can be an evolutionary psychologist without being an Evolutionary Psychologist.

Goodson is such a psychologist. He has produced a quite monumental work in a remarkably short space that defies adequate summary in the much shorter space appropriate here. I shall, instead, be somewhat critical of what I take to be a flawed masterpiece. I feel that I open myself somewhat to a charge of arrogance in doing this, and that I am perhaps being somewhat mean-spirited here. So let me start out by saying that this is a 'must read' piece of work. I would take positive issue with the cover blurb that sees it as 'appropriate as a textbook for undergraduate and postgraduate courses'. It is much more than that. It is a most thoughtful consideration of how mental abilities could be explored from an evolutionary perspective. It draws on over 100 years of empirical work. It will reintroduce students of any level to the contributions of Brentano, Ebbinghaus, Wundt, Thorndike, Jennings, Sherrington, Kohler, Lashley, Bartlett, Lorenz, and Thorpe, amongst others: work they may nowadays be unaware of. It will contextualize the evolutionary relevance of work by more contemporary contributors such as Gordon Bower, Donald Broadbent, Michael Posner, and Martin Seligman, again amongst others whom they should know about. It is 'appropriate to undergraduates' only if you have put them through a thorough grounding in contemporary work on the psychology of learning, a thorough introduction to

the history of psychology, additional courses in philosophy and cognitive science, and then posed to them the question: 'So, what does it all mean, then?'. It is after having posed that question that Goodson's book becomes a 'must read'.

First, Goodson begins at the beginning of evolution, outlining the issues that a form of organisation that is alive has to contend with. Here we get introduced to his emphasis on the 'function of cognition'. Living things only continue to 'do their thing' within relatively tight margins beyond which they cannot maintain their equilibrium and consequently revert to being non-living things. Hence his 'Fundamental Postulate of Process':

> *All overt or covert activity serves the immediate function of impelling the organism toward equilibrium* (p.46)

This might appear to be stating the obvious until one asks 'how does this happen?'. And it is dealing with this question that primarily occupies Goodson in this book. To restore something to equilibrium requires, crudely, that an organism can detect what it is currently lacking and how it can then rectify the situation. An organism has to become a focussed time-tripper, continuously monitoring its internal situation and prioritising the information it immediately receives from its environment so as to behave in a way that will restabilize its internal situation on this dimension, and thus reprioritise its interests in the information it subsequently picks up. And to do that it has to evolve appropriate detection abilities so as to detect what Gregory Bateson called 'information': 'the difference that makes a difference'. What makes a difference keeps on changing, and so, should an organism be able to detect a number of indicators of different internal disequilibria and a number of relevant external cues, it faces a selection problem: which one to deal with first. What I find intuitively brilliant in Goodson's dealing with how this selection problem is eventually handled by evolution is his appeal to the phenomenon of sensation, which he considers to be 'the primary solution to the input problem in complex organisms' (p.66). Simpler organisms can handle their simpler worlds by less complex means, but once evolution has come up with the where-withal for simpler organisms to handle their somewhat simpler selection problems, then it effectively creates for itself a new problem.

That is, as organisms find ways of sustaining themselves, they create new potential sources of energy that can be preyed upon. And as new sources of energy, they present more complex worlds for their possible prey to operate in. For example, an organism that eats a plant merely has to detect the plant and locomote to it, since the plant will remain where it is while it is approached. But an organism that eats organisms that eat plants can't work on such an assumption since their prey moves, and those movements need to be predicted if the prey are to be caught. And so on: more psychological time-hopping becomes required of organisms if evolution is to chance on successful designs that can exploit the conditions of life it has created as possibilities. The solutions require perceptual structuring to be achieved; learning and memory would be useful; the co-ordination of past experience with immediate ones (what Goodson terms 'apperception') so that an organism can selectively 'attend' to what there is in its world that meets the criteria for restoring its equilibrium - that it can momentarily tell what is 'relevant' to it. All this is fed by 'sensation': '*the outcome of processes in our neurological machinery as these are activated by energies in the environment. ... Sensation, and indeed all experience, evolved because it allowed organisms to adapt more effectively to their environment'* [p. 85].

In addition, Goodson pushes us to face the importance of hypothesising the evolutionary importance of qualitative differences between sensations, even though these differences are probably impossible to properly describe or investigate in any rigorous sense. We cannot, if

we are truly sceptical, know that animals feel pain or hunger. We can say they react to heat and 'hours of deprivation of food'. But from an evolutionary point of view, sensation is a good solution to enable the control of behaviour, as '*psychological transformations of body imbalances ... that provide the basis for appropriate compensatory behaviour*' [p. 90]. We can also see the evolutionary logic for a hierarchy in our tolerance to different sensations. For example, '*body trauma is more immediately critical for survival than either fluid or energy requirements ... [hence] ... pain is more intolerable than thirst, and thirst more intolerable than hunger*' [p. 91]. And again, our potential student reader now needs to be taken off for a reading of Wittgenstein's private language argument to contextualise the full evolutionary import of these points.

Goodson doesn't stop with the evolutionary mechanics of cognition as a handler of sensation:

> *If we were to stop here, we would have a fairly sophisticated perspective on the manner in which the selection pressures of evolution have gradually achieved living systems wherein many interdependent operations are monitored and regulated so that the balances necessary for life can be maintained. But to stop at this juncture would leave the picture far from completed. Behavior must now be integrated into [the] development [of the argument]* [p.257).

And so Goodson goes on to consider the linking of 'perception in general' to 'action as a result of detection': '*such reactions may occur with rigid and inflexible automaticity or, in their more complex expressions, they may be tied to plastic cognitive processes'* [p.286). In addition, he ties perception and reaction together through a notion of 'motocepts' ('*A phenomenological unity arising from the recurrent presentation of inputs arising from particular movements of the body'*, p. 318], and places himself at the point where he can take on language, learning, memory and human behaviour as a coda to his book (albeit in an associationist framework, which is not necessarily a bad thing after the recent excesses of innatist claims).

This is 'big picture' stuff, then, going from slime to symbol. It will really push any reader - through insights and observations marshalled together - into seeing and experiencing the kind of thinking that is required to really take an evolutionary approach in psychology. Yet, at the same time, it falls short of realising its project by a curious selectivity in what it draws on and outlines, and, as a result, what it ignores and leaves out. For example, Goodson outlines eight 'progressive steps' in the evolution of behaviour in his overview chapter. These make a lot of sense, but then so does Campbell's (1974/1982) ten-step categorisation of levels of knowledge within his framework of evolutionary epistemology, to which no reference is made.

Similarly, given the recurring appeal to the 'phenomenal', and the link noted between his own approach to cognitive evolution and the concerns of philosophers such as Husserl (p.129), it is difficult but to wonder why the work of von Uexküll (e.g., 1934/1957) is ignored. Again, being so wedded to the computational model of cognition, there is no mention of the many evolutionary insights coming from non-computational cognitive science (e.g., Clark, 1997; Rowlands, 1999). This may all seem to be nit-picking, but when the back-cover suggests, quoting from the foreword by Figueredo (p. xv], that '*this volume might become to evolutionary psychology what Euclid was to geometry*', then expectations are set high. Indeed, for a book proclaiming such an ambition, one might also have expected the publisher to have spent a bit more time checking the bibliography for errors, allowed for a few figures, and bound the paperback edition with covers that could be re-closed after opening the book more than once.

These points aside, this is still a 'must read' book. It well captures the kind of compelling logic that so characterises the best evolutionary theorising. It presents postulates that lay out principles for the evolution of 'behaviour' in the broadest sense. We need, I think, to add an additional explicit statement to those postulates presented here that evolution produces the conditions for its own further elaboration to get the fuller picture, and empower students with the full glory of what evolutionary thinking can offer to psychology. By this I mean the way in which evolution, in exploiting the possible niches created by any assemblage of organisms creates new niches that require new solutions if they are to be made actual niches for actual organisms. Thus, for example, in solving for any particular organism an evolutionary problem by instituting locomotion, then evolution thereby creates a need for the cognitive ability to predict where a locomoting source of energy will be by the time a possible organism that could sustain itself from the energy embodied in that locomoting organism can get close enough to that energy source to eat it. And unless a solution to the problems evolution sets itself can be found, then the whole system will tend to stasis.

In sum, then, this book has the ability to stretch anyone's thinking about the fundamental issues of what cognition might be there for, and the logic of how it got elaborated.

Andy Lock, Professor of Psychology, School of Psychology, Massey University, Palmerston North, NEW ZEALAND.
Email: A.J.Lock@massey.ac.nz.
URL: http://www.massey.ac.nz/~alock/.