

Leader of the pack

You have just been elected a Fellow of the Royal Society, one of a tiny minority of psychologists amongst the 1300 or so Fellows. Why are there are so few psychologists who have become Fellows, and how significant is it?

There aren't many psychologists who are really eligible, because you have to be working at the biological end of psychology to be considered for the Royal Society. Fellows are elected under one of two categories: physical science and engineering, and biology. Consequently, I suspect that election to the Society has more impact within the biology community than within the psychology community at large. However, it is important to have psychologists in the Royal Society, as they give our discipline a higher profile amongst the wider scientific community in this country. The Royal Society is the most prestigious natural science society in the UK, but because psychology covers such a broad spectrum – all the way from the humanities to behavioural neuroscience – it's very hard to gain a strong representation in organisations such as the Royal Society.

Do you think that this dilutes the potential impact of psychology?

Yes. For example, the Royal Society is concerned with the public comprehension and status of science, and it is also the pre-eminent scientific body for influencing government policy. The government draws on the expertise of the Royal Society for scientific advice and for formulating science policy; so to the extent that we want to have an impact at all on such policy, then clearly the stronger our representation in the Royal Society the better. I hope to contribute to the activities of the Royal Society and thereby assist in enhancing the profile of psychology in the general scientific community.

Your election to the Royal Society is in recognition of your work as a comparative psychologist. Given the broad spectrum of psychology, why did you become interested in comparative psychology?

Although I'm interested in human psychology, the adult mind is so historically determined by culture and education that it seems to me that it may

PHIL STRINGER interviews comparative psychologist **TONY DICKINSON**, Fellow of the Royal Society.



be very difficult to uncover the biological foundations of the mental through studying the human mind. What I should really like to ask is: What was the mind of hunter-gatherers like 60,000 years ago? This led me to look at the ahistorical, acultural minds of animals in an attempt to discover the basic biologically determined properties of mentality. So, the questions that interest me are the extent to which minds without language, culture and education are rational and representational, and how their cognitive processes interact with emotion, affect and motivation to control behaviour.

The Royal Society citation highlights your work in associative learning, human causal judgements, goal-directed action, mental time travel in animals, and episodic memory. Is there anything that particularly stands out for you?

The discovery that animals are not just stimulus-response habit machines, but rather that they are capable of purposive, goal-directed action, which I do not think had been convincingly demonstrated prior to our work of reward revaluation. The work then led me to ask whether cognition and even primary consciousness have their origins in the evolution of goal-directed behaviour. This issue relates to an enduring

question in comparative psychology: What, if anything, makes the human mind unique? A standard response, going back to Descartes, is that only humans are capable of rational thought and, therefore, of rational action. Our research challenges this claim by demonstrating that animal action in some circumstances appears to reflect a form of practical reasoning.

So, if some animals are capable of goal-directed action, and in that respect perhaps more capable than we have given them credit for, what do your studies on episodic memory show?

This research relates to another comparative psychology thesis that only the human mind is capable of mental time travel. According to this idea, animal minds are incapable of travelling backwards in time to remember specific episodes in their life, nor are they capable of travelling forwards to undertake long-term planning. The work itself came out of a chance meeting with a biologist, Nicky Clayton. In the mid-1990s I didn't believe that animals had episodic memory. I didn't see their need for it. All they required was knowledge of the general features and properties of their environment – where to find food, how to avoid predation, and so

on. Then I happened to meet Nicky at a conference. She had a colony of food-storing birds, scrub jays, which cache food in times of plenty and only recover it later when food is scarce. Nicky argued that this recovery was achieved through something like episodic memory, and so we embarked on a research programme to see if these birds did indeed show the characteristics of episodic memory. It is a good example of how ecological knowledge can inform a psychological programme, because I had never even thought about the relevance of food-storing to the mental time travel hypothesis. There is a great Gary Larson cartoon that we have used in an article recently published in *Nature and Neuroscience* that summarises the results of our research. It depicts the animals of the forest sitting around in a glade reminiscing about where they were and what they were doing when Bambi was shot.

What impact has this work had so far?

It has attracted a lot of attention, because episodic memory is particularly vulnerable to brain damage and ageing. As a result, there is considerable interest in the properties of this form of memory and whether there are any valid animal models of it. Clearly, the work itself doesn't have direct relevance for human memory loss, partly because these specialised food-storing birds have very different brains from ours, which means that they are not the ideal animal model for understanding the neurobiological basis of memory and amnesia. Though once you have worked out procedures and a way of thinking about the questions, and established behavioural paradigms, then you can develop animal models that do allow you to address the neurobiological aspects of memory.

Has your research presented a challenge for anyone?

Our claims about animal mental time travel are controversial and are currently a matter of debate in the literature. I suspect that my view about the origins of consciousness being grounded in goal-directed behaviour finds less favour among my colleagues. Most comparative psychologists and

animal learning theorists are more comfortable with an associative, mechanistic language and are very wary of reference, especially in animals, to rational, intentional processes. This caution arises from the fact that models of the brain map very well into connectionism and associationism, whereas, as yet, no one has a good model of how cognitive processes involving representations with semantic properties and inference processes are embodied in neural machinery. Of course, the whole community of psychologists in general is very happy working at this cognitive level, and it is only when you step back and think 'How does the brain ever do this?' that the fundamental problems arise.

How does a comparative psychologist relax?

My two main interests are classical ballet, and motorcycles. Surprisingly, there is a similarity between motorcycling and ballet, in that they both require a harmony of mind and body. For instance, on a motorbike, the fastest way round a corner is usually the most beautiful; that gives me, as a spectator, a thrill that matches my pleasure in seeing a wonderful grand jeté or arabesque. Although I have never dared to take a ballet class, I have been involved with motorcycles most of my adult life and own a variety of bikes. One of the great things about motorcycling is that it has taken me into such a diverse community of people all welded together by a great camaraderie. Also, when riding, you are exposed, you are very vulnerable, and you can never take anything for granted. You are wrapped around this mechanical device that you are steering, and you have to be one and the same thing. So, you need to wipe your mind clear of the extraneous thoughts and cares of daily life and just concentrate on the unfolding ribbon of road before you. However pompous and pretentious it might sound, riding a fast bike well can be a Zen-like experience.

So, in a different life you would have written *Zen and the Art of Motorcycle Maintenance*?

I loved that book [see bonigv.tripod.com]. It is a wonderful tract for the early Marxist theory of non-alienated labour, expressed through bikes. I am a great believer in this aspect of Marxism, which explains why the academic life is so addictive – you have great personal autonomy and you relate to your research community as an individual through the products of your labour.

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