



The interplay of function and mechanism in decision making Alex Kacelnik, Oxford University

I contrast two approaches to the study of mechanism and function in decision making, one based on rules of thumbs or heuristics and another based on the contributions of experimental psychology and psychophysics. The former is the most frequently used by behavioral ecologists. It implements a behavioral gambit by which researchers deal with hypothetical decision problems without reference to independently known cognitive processes. Typically, cost-benefit analyses of the problem are carried out to identify adaptive solutions, and then simple rules are envisaged and tested for their level of performance. As a final step, not always followed, the properties of one or more of these rules are sought in behavioral data. The alternative approach shares the interest in the functional consequences of behavior, but shows greater subordination to empirical research on behavioral and cognitive mechanisms. In this case natural selection is seen as acting on processes that tune behavior to the environment across broad domains such as the need for behavior to respond to causal relations and to process sensory information across exceedingly large ranges in the input. Associative learning and Weber's Law are two putative evolutionary responses to such challenges. In the second approach these independently known traits, rather than ad-hoc rules or heuristics, are considered as candidates for effecting decisions, and this can often lead to asking for the functional problem a posteriori, querying what selective pressures might have led to the presence of the trait. I argue that for a majority of decision problems investigated across vertebrates the second approach is preferable, and illustrate my reasons with examples from foraging research, but I also recognize that dedicated rules are preferable when the relevant information acts across generations and involves little learning, as is the case with life-history adjustments or responding to lethal threats that offer no second choices.