

## Invited Commentary

### Response: how much you need to engage with mechanism depends on what you are trying to do

Daniel Nettle,<sup>a</sup> Mhairi A. Gibson,<sup>b</sup> David W. Lawson,<sup>c</sup> and Rebecca Sear<sup>d</sup>

<sup>a</sup>Centre for Behaviour and Evolution, Institute of Neuroscience, Newcastle University, Newcastle upon Tyne NE1 7RU, UK,

<sup>b</sup>Department of Archaeology and Anthropology, University of Bristol, 43 Woodland Road, Bristol BS8 1UU, UK, <sup>c</sup>Department of Anthropology, University College London, 14 Taviton Street, London WC1H 0BW, UK, and <sup>d</sup>Department of Population Health, London School of Hygiene and Tropical Medicine, Keppel Street, London WC1E 7HT, UK

We would like to thank our 4 sets of commentators for their stimulating and supportive words. Their reactions give us some hope that our characterization of the field was not wildly off the mark and confirm our belief that the issues we identified in our paper as open questions really are open questions. We agree with many of the points raised and will not repeat them one by one here. A major theme that arises from all of them is that behavioral ecology (BE), perhaps of humans in particular, cannot afford to ignore the mechanisms by which behaviors are acquired. We would like to make 3 points about this position.

The first is that mechanism is a Chinese box. Advocates of cultural evolution models argue that these are more realistic than traditional optimality models because they take account of the mechanisms by which behavioral strategies are acquired. However, these models ignore the details of the cognitive science involved in learning, though these details could matter a lot for the outcomes you get. Cognitive science in turn does not delve into the systems neuroscience of how the brain actually implements learning algorithms. Systems neuroscience takes the neuron as a black box and does not engage with the biochemical processes within the cell, though the exact properties of these could make a lot of difference. In practice, then, every subdiscipline is seen as mechanistically agnostic by the subdiscipline below it in the hierarchy of biological organization. We are sure that no one would advocate that all studies of behavior should begin at the level of the potassium channel. It follows that the science of behavior must, therefore, always be a multimethod, multilayered enterprise with interesting dialogues and interactions between layers. The phenotypic gambit indeed entails a risk and so parallel, or better yet integrated, research on the mechanisms that guide behavior is always desirable. But regardless of which level of analysis a researcher seeks to understand, basic BE data on environment–behavior relationships and the fitness outcomes of alternative strategies will always be an essential foundation of evolutionary research on humans.

The second point is that the extent to which researchers have to engage with mechanism depends in part on what question they

are seeking to answer. The overall explanatory goal of BE/HBE can be decomposed into a number of subgoals. For example, sometimes researchers simply want to know what the relationship is between some phenotypic trait—say status, personality, or physical stature—and reproductive success. Here, you just need a good measure of the trait and a good measure of reproductive success, though an estimate of heritability is also useful to predict the response to selection. Sometimes researchers want to know what the optimal behavior in a particular socioecology would be in terms of maximizing inclusive fitness and ask whether their study population is doing it (the answer may often be no, but could sometimes be yes). Here, they need a good optimality model and good characterizations of the socioecology and the behavior. At other times, though, researchers may want to answer a more global question such as “why did the demographic transition occur?” and “why do European societies have enforced monogamy?” We agree that for these kinds of questions, understanding history and of mechanism are going to be crucial. Thus, human behavioral ecologists will need to engage with mechanism at different levels and to differing extents depending on what the exact question is.

Our third point is that there are resources available in humans that offer exciting possibilities for the study of mechanism as well as function. Although we agree with Barrett and Stulp that humans have obvious limitations as a study species, they have some notable advantages too. Humans are the most studied species on the planet. The problem of integrating mechanisms into HBE, therefore, may partially be solved by a greater integration with the wealth of data, expertise, and empirical research that already exists in the cognitive, social, and medical sciences. To give a few examples, psychologists and neuroscientists can help us understand cognitive mechanisms; demographers and physiologists the nuts and bolts of reproductive function, including hormonal mechanisms; sociologists and anthropologists (at least those committed to a basically scientific approach) sociocultural mechanisms; archaeologists and historians historical detail. This work includes a range of methodologies that speak to several different levels of mechanism. Some of these methodologies are denied to animal BE, and certainly there are few species on which so much data of so many different kinds exist. For those questions where mechanism is important, HBE is perhaps relatively fortunate among BE in having the opportunity to integrate its own work into this existing (and ongoing) body of knowledge.

We conclude by fully supporting Borgerhoff Mulder's comment that HBE mustn't give up on its traditional strengths of collecting its own data on small-scale societies, while calling for a continued expansion of HBE's boundaries into new methods, topics, and study

populations. This will achieve the twin aims of HBE made explicit by Barrett and Stulp: contributing to basic science by adding to the broader field of BE and improving our understanding of human behavior. There is still much to learn about the BE of humans living in “traditional” small-scale societies, in the modern postindustrial world and, perhaps most of all, in those populations in the developing world currently undergoing rapid demographic, economic, and cultural change. Research on the latter, in particular, also has the potential to add a third aim to HBE research: to contribute new insights on how humans interact and respond to their environments to the real world of policy-making, a very significant goal in its own right.

Address correspondence to D. Nettle. E-mail: [daniel.nettle@ncl.ac.uk](mailto:daniel.nettle@ncl.ac.uk).

Received 18 February 2013; accepted 21 February 2013.

doi:10.1093/beheco/art020

**Forum editor:** Sue Healy

## REFERENCE

Nettle D, Gibson MA, Lawson DW, Sear R. 2013. Human behavioral ecology: Current research and future prospects. *Behav Ecol. Advance Access published January 29, 2013*, doi:10.1093/beheco/ars222.