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Published in:
BioEssays

DOI:
10.1002/bies.201900079?af=R

Publication date:
2019

BioEssays
www.bioessays-journal.com

Describing Atypical Instances of Intelligence: The Case of Habituation

Fred Keijzer

It is becoming increasingly clear that intelligence must be considered as a widespread, even universal, biological phenomenon. The presence of intelligence, or basal cognition, is signaled by phenomena such as sensing, differentiating beneficial and not beneficial states, decision-making, memory, anticipation, and learning.[1] Such phenomena have been shown to be present in bacteria, plants, fungi, protists, and a very broad range of animals.[2] For example, Boisseau et al.[3] recently showed the presence of habituation in slime molds, adding to earlier findings in protists that habituation is widespread and not limited to animals with nervous systems.[4]

These findings create a new situation for the demarcation of (basal) cognitive phenomena. Psychology and cognitive science did always rely on common sense judgments as to what to study, usually either behavior or mental processes as occurring in the brain. In this approach, intelligence can be recognized by using common sense, which excludes many of the new findings. While this exclusion has now been challenged in various experimental settings as mentioned above, at a general conceptual level more work needs to be done. The idea that intelligence can take forms that diverge from our long-standing intuitive interpretation remains a conceptual hurdle that research on basal cognition still needs to overcome.

For example, take the difference in meaning between general concepts like behavior, growth, and memory. These concepts have clear and separate meanings in the context of animal behavior, but much of plant behavior and decision-making involves directional growth and the generation of structures that reflect past experience with various stressors and beneficial factors. The standard differences between these ordinary concepts are challenged in such cases. As a result, claims concerning plant behavior may sound weird or simply wrong, despite the evidence supporting such statements. Developing clearer and more encompassing descriptions and concepts is therefore an important next step for research on basal cognition.

The model of habituation proposed by Bonzanni et al.[5] published in this issue provides a good example of extending and generalizing current descriptions of psychological terminology. Habituation is a temporary modification of a response to recurring stimuli and widely considered as the simplest of learning processes.[4] However, habituation is often described in terms of specific mechanisms that can be very different between various organisms, such as animals, plants, protists, and slime molds. In this paper, Bonzani and coauthors present a model that casts habituation as a generalized process that is not tied to any specific substrate and therefore can be applied widely to different cases of habituation.

Accepting the many new cases of and forms that intelligence can take will remain difficult as long as we look at them with common sense interpretations. Moving beyond such interpretations—such as for the classic psychological concept of habituation—will require a dedicated effort that combines empirical, theoretical, and conceptual work. It can be expected that this enterprise will involve a significant reshuffling of long-standing concepts centered around the mind and the cognitive domain. In other words, we can expect interesting times!

Conflict of Interest

The author declares no conflict of interest.

Received: May 10, 2019
Published online: June 24, 2019

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The ORCID identification number(s) for the author(s) of this article can be found under https://doi.org/10.1002/bies.201900079.

This article comments on the Ideas & Specualtions article by Bonzanni et al. https://doi.org/10.1002/bies.201900028

DOI: 10.1002/bies.201900079