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A community of minds

Commentary on [Mather](#) on *Octopus Mind*

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Abstract: Mather (2019) provides an excellent overview of the literature on octopus perception, cognition, memory, and behavior. Anyone interested in cephalopod cognition and brain organization will find her target article informative and interesting. In this commentary, I challenge the idea that an individual organism must have an individual mind. Given the structure of the octopus brain and their complex behavior, one must consider the possibility that an octopus is a community of minds rather than a single mind.

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Mather (2019) provides an excellent overview of the literature on octopus perception, cognition, memory, and behavior. It also provides a detailed but understandable tutorial on the neural organization across octopus species and other cephalopods. Mather shows that octopus behavior is complex and flexible. She also makes the case that octopuses have conscious and unified awareness. However, she makes unwarranted assumptions in discussing the concept of mind and self-awareness, and that will be the basis of my commentary. Along with Carls-Diamante (2017, 2019), I think the evidence is still not clear if a better account of octopus behavior rests in their ability to take advantage of multiple conscious representations. Thus, I present the unorthodox position that octopus cognition may be a community of minds rather than a unified mind.

Unified vs. multiple minds. Mather provides compelling evidence that the neural and cognitive mechanisms underlying octopus behavior across the many octopus species are vastly different from their vertebrate analogs in birds and mammals. This view starts with the observation that the majority of neurons in a typical octopus are in its arms, not in its brain. This contrasts with the typical vertebrate organization in which neurons are concentrated in the brain (Thivierge & Marcus, 2007). What might it mean for the concept of mind if most of the neural system is situated in the part of the anatomy that engages in the world rather than sequestered in a central brain? Whereas we think of ourselves and infer for other mammals that one unified mind exists that creates a continuous identity, might it be that mind for an octopus is an interactive community of independent “arm-minds”? We know that individual octopus arms can be conditioned independent of each other (Wells, 1978). Moreover, some data suggest that severed

octopus arms continue to function for some time after they are detached from the animal (Sumbre, Gutfreund, Fiorito, Flash, & Hochner, 2001). Thus, Carls-Diamante (2017, 2019) suggests that an individual octopus may be a community of arms rather than a unified consciousness. Such a view is not inconsistent with some degree of central control that can be invoked when coordinated action or unusual circumstances are identified. Nor does the view that an octopus may be a collection of interconnected minds rather than a unified one negate the complex and vertebrate-like things that Mather shows an octopus can do. As a counter-example, Mather points to split-brain patients who act in odd ways because of their severed corpus callosum, but still experience a unified consciousness. The point is well-taken, but to call on human analogs, one could also invoke Dissociative Identity Disorder, in which multiple human minds inhabit a single brain (Ross, 1997). Just given octopus neurological idiosyncrasies and their unique behavioral adaptations, I wonder if it is any less consistent with the data to think of multiple minds, rather than a single mind that conforms with what we know about vertebrates.

In *The Language Instinct*, the linguist Steven Pinker (1994) imagines a world in which some biologists are elephants. In this saucy analogy that pokes fun at animal-language projects, Pinker imagines how such elephant biologists would puzzle over other animals' poor nasal dexterity (Pinker, 1994, p. 332). His general point is that it is unwise to judge other creatures by the metric of our evolutionary strength, that is, language (or our flexible intelligence). Mather suggests that a unified mind makes the octopus more cognitive and more intelligent because a unified mind makes them more like us. There are multiple ways in which a species can demonstrate intelligence and adaptability. For elephants, it is trunk dexterity, whereas for humans, it is language. It is thought-provoking to consider that octopus species achieve their cognitive flexibility through internal communication among independent minds.

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