

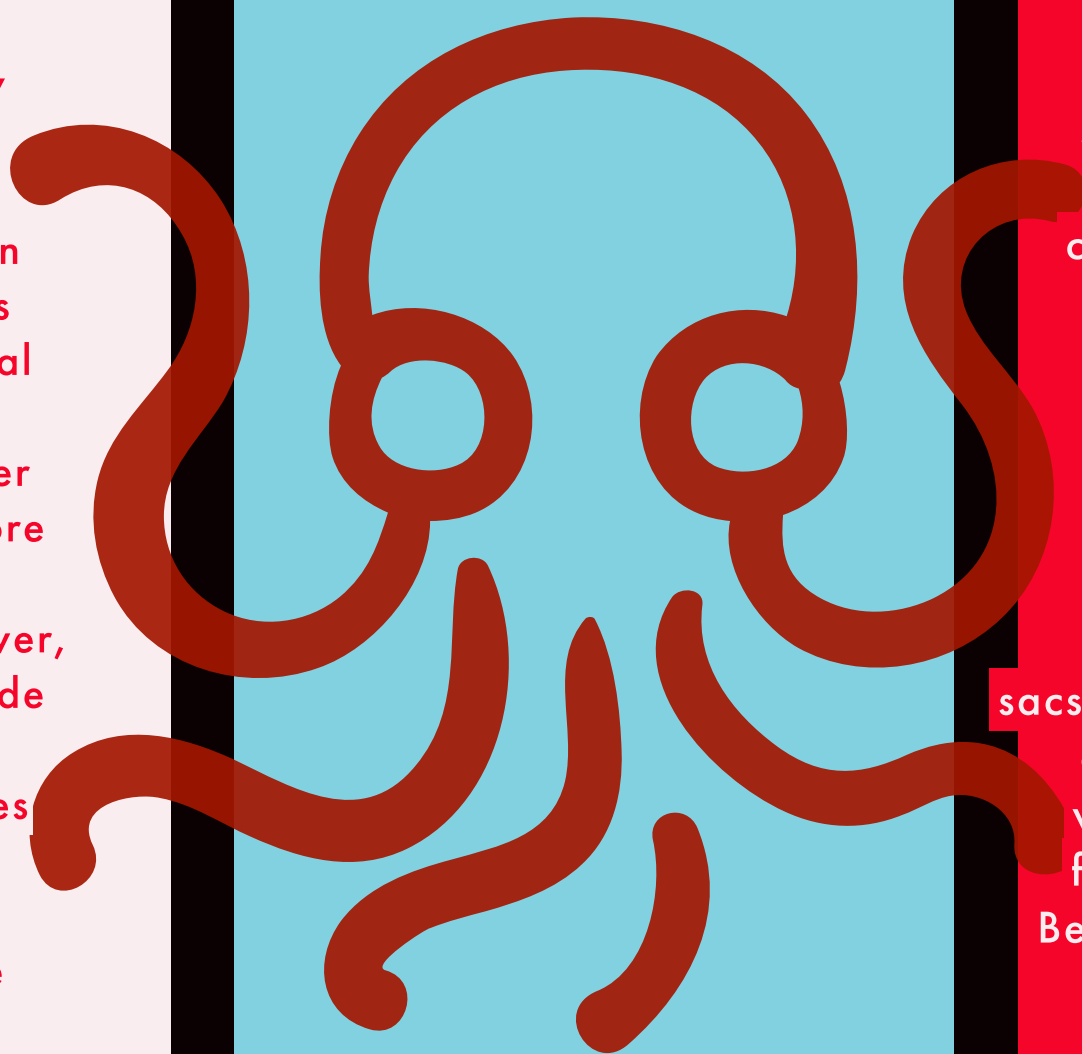
THE 5 FACETS OF THE OCTOPUS

An Introduction & Commentary on the Octopus in Peter Godfrey-Smith's Book: *Other Minds*

By Xingru Nicole Ma

2. A Different Nervous System Layout

Although both humans and octopuses have remarkably large and complex nervous systems, the layouts of the systems are very different. In humans, the central nervous system has clear hierarchical control over the peripheral nervous system. On the other hand, the octopus has a more distributed nervous system. It does have a brain; however, the majority of neurons reside in the octopus' arms. This distribution of neuron implies that the octopus brain does not have absolute control over the rest of its body like we do. Rather, the octopus brain-body relationship is more like that the brain guides the arms into a direction and let the arms carry out fine movements themselves.



1. Evolution History

Octopuses are members of the Cephalopod class, while us humans are members of the Mammal class. Octopuses and our most recent common ancestor is probably a worm-like creature with a rudimentary nervous system that lived 600 million years ago. This means that the ancestors of octopuses and humans had no complex nervous system legacy to inherit from, so the large nervous systems both groups now achieve are from independent developments. As a result, our nervous systems are very different.

3. Changing Colors

Octopuses are part of the cephalopod class in which members present different skin colors. Another prominent member of the class that changes colors is the cuttlefish. Both octopuses and cuttlefish control the muscles in the skin with their brains, and these muscles in turn stretch or relax the color chemical-containing sacs in the skin to reveal or hide different colors in the sacs. In other words, cephalopods directly control their skin color with their brains, a remarkable feature unthinkable to humans! Because of this close connection between brain and skin color, Godfrey-Smith speculates that the animated color patterns that some cuttlefish present are a reflection of the mental state of the animal, or even dreams.

4. Life Span

Surprisingly, octopuses, organisms that devoted much energy and resource to develop large nervous systems, usually only live for 1-2 years. This strange combination of short life span and large nervous system may be due to the octopus' life style. On the one hand, octopuses need a well-coordinated body to actively hunt for food, thus the large nervous system. On the other hand, hunting exposes these bone-less organisms to great threat from other predators, so giving all resource into one reproduction actually gives more offspring than living for a longer time and reproducing multiple times, thus the short life span.

5. Subjective Experience?

In the book, Godfrey-Smith identifies different forms of octopus subjective experiences. An example of it is inferred from octopuses' ability to maintain perceptual constancies, the understanding that an object can appear differently from different angles or distances of observation. Such an ability is only possible if the organism has a separate perception of self and external objects. He also mentions the octopus experience of curiosity, based on observations that octopuses like to explore novelty in the environment. However, it is unreliable to infer octopuses are curious or humanize octopuses based on observations, as the same behavior can be interpreted in different ways. For example, the same octopus arm-probing behavior is interpreted as aggressive "boxing" by Godfrey-Smith, while as friendly "high fives" by another person in the book. So whether octopuses have the more sophisticated kinds of subjective experience like curiosity and emotions is yet a mystery.