

# The Facts That We Have Been Mistaken About Our Minds, Language, and Octopuses; “*Other Minds: The Octopus, The Sea, and The Deep Origins of Consciousness*”

Jung-Woo Son

Department of Neuropsychiatry, College of Medicine, Chungbuk National University, Cheongju, Korea

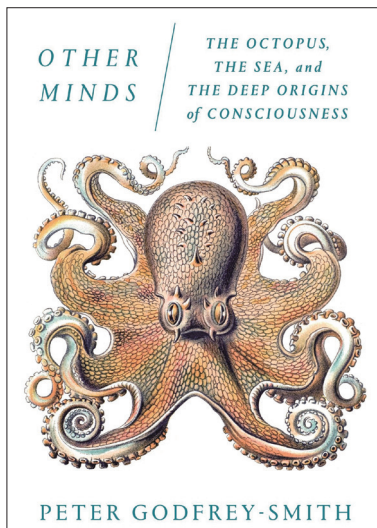
To date, we have made inferences on the behavior and mind of humans and animals from the perspective of humans, or for the sake of familiarity, vertebrates. The book, “*Other Minds: The Octopus, The Sea, and The Deep Origins of Consciousness*” by Peter Godfrey-Smith makes us realize how erroneous preconceived notions could be, and presents a novel perspective on the results of evolution. Throughout this book, readers will learn about the characteristics of the nervous system, behavior, and habits of cephalopods, which include octopuses. Through this book, readers will gain a new perspective on the embodiment, minds, nervous systems, consciousness, and sociability of humans and animals. Furthermore, the book will provide the imaginary experience of swimming in “Octopolis” inside the ocean with the author.

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Address for correspondence: Jung-Woo Son, Department of Neuropsychiatry, College of Medicine, Chungbuk National University, 1 Chungdae-ro, Seowon-gu, Cheongju 28644, Korea

Tel: +82-43-269-6187, Fax: +82-43-267-7951, E-mail: mammosss@hanmail.net



**Fig. 1.** The cover of “*Other Minds: The Octopus, the Sea, and the Deep Origins of Consciousness*”.

Although it has been a while since its release, “*Spider-man 2*” [1] has been one of the most well-received films in the *Spider-man* series. Indeed, in this movie, the main character, Peter Parker (nicknamed the first “livelihood hero” in Ko-

rea) is an ordinary student with relatable concerns such as personal finances, while having to live his life as a hero. The process in which his girlfriend, Mary Jane, found out about his real identity, was also portrayed intriguingly. Nevertheless, the film captured the hearts of many people because of the attractive villain, “Doctor Octopus.” Doctor Octopus, who used to be Doctor Octavius, played the role of a villain in the movie, controlled by the mechanical arm he transplanted onto himself. At the end of the film, however, he retrieves his identity as Dr. Octavius and buries himself and the mechanical arm in the sea from his own ‘will.’

In a way, the cinematic setting in which a person becomes controlled by a machine that is transplanted into his or her body is familiar. Nevertheless, as for me, who never thought of the relationship between the octopus’ arms and itself or its arms and brain when watching the movie, some of the brilliant phrases in the book, “*Other Minds: The Octopus, The Sea, and The Deep Origins of Consciousness*” [2] triggered feelings of bitterness toward my ignorance and prejudice in thinking that the brain would no doubt control all parts of an animal’s body. In 2004, when “*Spider-man 2*” was first released in Korea, the concepts of ‘embodied mind’ and ‘embodiment’ were slowly introduced in the fields of cognitive science and psychiatry in Korea. Personally, it was around the time in which I started to become intrigued about the con-

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cept of embodiment after first becoming acquainted with the comment through the book *"The Embodied Mind"* by Varela et al. [3], the first of its kind to be translated and published in Korea in 1997. The few times I had watched *"Spider-man 2"*; however, I thought of the movie as simply a movie, the octopus as simply an octopus, and embodiment simply as embodiment, never dreaming of exploring the connection between the concepts.

*"Other Minds: The Octopus, The Sea, and The Deep Origins of Consciousness"* [2] is an implication of thoughts of Godfrey-Smith, whose life encompasses that of a scientific, biological, and evolutionary philosopher and an experienced scuba diver. The octopus! What kind of preconceptions do we have about this species? A unique animal that lives in the ocean, but is not a fish? An ingredient in a delicious dish? The gambler who appears as a regular guest in the world cup winning performances? A catch that we wish to catch while fishing at least once? We have been limited to such simple thoughts because the interest we have in animals was mainly restricted to vertebrates (i.e., fish, amphibians, reptiles, birds, and mammals). In fact, how unique and important was the appearance of 'cephalopods' in the fauna.

*Octopus vulgaris* contains 500 million neurons in its body. Although this is a small number compared to the 100 billion neurons the human nervous system is known to have, it is similar to the number of neurons found in smaller mammals such as dogs. This implies that it has a much larger nervous system than other invertebrates. Furthermore, most of its nervous system is spread throughout its body, not only in the brain. Approximately twice the number of neurons found in the central brain is found in the octopus arms. The reason for this is because octopuses do not have the 'foot' found in most molluscs. Instead, what would have been the 'foot' differentiated into a mass of tentacles with no joints or shells. While such evolutionary outcomes enabled the octopus to exhibit an enormous variety of movements, it has also increased the need to coordinate such movements systematically and consistently. What is even more surprising is that the octopus selected an evolutionary mechanism that differs from the one we know—a system in which the central brain controls all of the peripheral nervous system. Godfrey-Smith puts it this way: "... Rather, they have fashioned a mixture of local and central control. One might say the octopus has turned each arm into an intermediate-scale actor" (p.71). Reading this book, or surfing the web out of curiosity, one realizes that the independent and integrated activities that take place between the central brain and peripheral nervous system of an octopus are very harmonical. Anyway, "... Octopuses, as they evolved their complex behavioral abilities, opted for a partial delegation of autonomy to their arms. ....

But from the central brain's perspective, they (the arms of octopus) are partly non-self too, partly agents of their own" (p.102). That is, although merely an example of cinematic imagination, we conceive the experience of Dr. Octopus in *"Spider-man 2"* as a revolt of local body parts against the central brain. Such cinematic imagination was possible only because the character was an octopus (I am curious, then, on whether the crew was aware of the nervous system characteristics of octopuses).

Such a unique nervous system of an octopus makes one realize, as stated by the author, that the octopus is a 'differentially embodied' or 'disembodied' animal. Indeed, the octopus lives outside the usual body/brain divide (p.75). Although the reader believes that this alone is wonderful and mysterious, Godfrey-Smith does not stop here. Such important concepts are presented continuously and logically, along with the author's observation notes of octopuses in the sea to support his brilliant thoughts. This book is truly a testament to the author's "embodied experience."

A comparison of the latecomer theory and the transformation theory involving the evolution of consciousness, as well as the white noise theory of early consciousness, may also give readers an ethical dilemma. This is especially true for those of us who simply regarded the octopus as food. In particular, the process in which another cephalopod species, the giant cuttlefish, makes colors on its skin provides readers with another insight. There is a part that makes the readers think, 'no way!'; "..... Cephalopods, in almost all cases, are said to be color-blind" (p.169). Readers may find it fascinating to realize that cephalopods are color-blind, considering that in the page immediately preceding this portion of the book, Godfrey-Smith described in great detail how the giant cuttlefish (the author named them after famous painters such as Matisse, Kandinsky, etc.) approached him, how they curiously extended their arms to him and changed their skin color into vivid shades while swimming together. Godfrey-Smith interprets this change in skin color as an "expression of communication" and contrasts the communication and social system of the baboon with the sociality of the giant cuttlefish as a logical explanation for his interpretation. Such conclusions are only possible from deep reflection; "... On the baboon side, there is a soap opera life, frantic and stressful social complexity, and little means to express it. On the cephalopod side, there is a simpler social life, hence less to say, but such extraordinary things expressed nonetheless" (p.133). That is, the changes in skin color of the giant cuttlefish were not merely for camouflage. Indeed, they could be monologues and chats expressed endlessly by each individual throughout life. As a large proportion of the readers of this journal involve several child and adolescent psychiatrists

and related professionals, they may also be interested in autism spectrum disorders. As such, many readers may inevitably entertain the following questions in the portion of the book described above: What is sociality? What is language? What is communication? What really is autism?

The readers' concerns will likely continue as they read Chapter 6, "Our Minds and Others." When the author connects Vygotsky's inner speech theory to the efference copy theory, and our subjective conscious experience, readers may be left in awe of how deeply the author reflects on the subjective phenomena of consciousness in humans and animals.

Following these exciting and profound topics, Chapter 7, "Experience Compressed" brings about a type of solemn. Once exposed to the evolutionary interpretations of the reason behind the short lifespan of such a highly intelligent species, readers are prompted to reflect on the mundane views we have had on aging and death.

My short review regarding this book will not be enough to cover all Godfrey-Smith's beautiful writing and profound ideas. Nevertheless, this book challenges the various paradigms that we in academia had become accustomed to, especially pertaining to psychiatry, psychology, and cognitive

science, with questions such as "What are humans?," "What is consciousness?" and "What is sociality?." One may even say that it is a refreshing punch to the head. Furthermore, how can an octopus move me this much! I wish to express my heartfelt gratitude to Godfrey-Smith for providing me with such emotions and profound experiences. I also wish to follow his skin scuba guide to visit "Octopolis" on the east coast of Australia, his sacred place, although the octopus and giant cuttlefish named Matisse and Kandinsky, respectively, may no longer be there.

#### Conflicts of Interest

The author has no potential conflicts of interest to disclose.

#### ORCID iD

Jung-Woo Son <https://orcid.org/0000-0003-4972-3923>

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