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Alien Minds, Blindsight, and the Evolutionary Origins of Consciousness

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In his recent book, *Other Minds*, philosopher Peter Godfrey–Smith starts with an epigraph from William James (1890) on the need for *continuity* in accounts of the origin of consciousness (Godfrey–Smith, 2016a, p. vii). Godfrey–Smith approaches the evolution of consciousness by "thinking about different sorts of animals" and "the long spans and successive regimes in the history of life." Among philosophers, he lists the positive influence of Daniel Dennett. Evaluating Godfrey–Smith's claims in the philosophy of mind in comparison to James and Dennett, on the defense of the "Spencerian," adaptationist view of Darwin and evolution, helps locate Godfrey–Smith's philosophy of psychology and mind. In spite of affinity with themes from Herbert Spencer, James and Dennett on biological evolution, Godfrey–Smith gets James's psychology wrong. Partly in consequence, tension arises from Godfrey–Smith's thesis that "subjective experience," as contrasted with consciousness, arrived quite early in evolutionary history. Another claim is that human encounters with the octopus are probably the closest we will come to meeting an intelligent alien. Review of Godfrey–Smith's accounts of cephalopod intelligence provides relevant evidence from ethology. What eventually becomes doubtful, as argued below, is the scant attention to the experimental phenomenon of blindsight; and there is a related philosophical equation of sensory–motor intelligence with subjective experience. Following Dennett's "instrumentalism" too closely leads to serious misunderstanding of James; and misunderstanding James as an "internalist" gives rise to doubtful and poorly argued theses concerning consciousness and subjective experience. Godfrey–Smith's theory of "subjective experience" in contemporary animals does not rule out plausible, nonconscious alternatives regarding their ancient, Cambrian forbearers.

Keywords: consciousness, blindsight, evolution, continuity

Continuity, William James and Other Minds

Consulting Daniel Dennett's work (Dennett, 1995, pp. 394–395; 2017, pp. 138–146) including his references to Godfrey–Smith, what stands out is the

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"Spencerian," or gradualist and empiricist–adaptationist or "externalist" thesis — in contrast to more recent "rationalist" or internalist–structuralist revisionism. Godfrey–Smith substantially agrees with Dennett on this theme, and the agreement is the basis of Godfrey–Smith's opposition to "internalism." "Inner" relations are *adapted to* "outer" relations. Part of the problem is that Godfrey–Smith gets William James's psychology wrong: giving equal standing to James's psychology and his later pragmatism and philosophy of religion.[1]

In his *Principles of Psychology*, James wrote:

> The demand for continuity has, over large tracts of science, proved itself to possess true prophetic power. We ought therefore ourselves sincerely to try every possible mode of conceiving the dawn of consciousness so that it may *not* appear equivalent to the irruption into the universe of a new nature, non-existent until then. (James, 1890, Vol. I, p. 148)

Godfrey–Smith aims to "take us closer to the goal James laid down" on continuity (2016, pp. 77–78), and this implies the need for a reconciliation between understanding consciousness in terms of subjective experience, including Thomas Nagel (1974) and "what it is like" to be a particular animal, and the natural sciences of biology, chemistry, and physics. "*Subjective experience* is the most basic phenomenon that needs explaining, the fact that life feels like something to us" (Godfrey–Smith, 2016a, p. 78).

It is not that James uniformly endorsed Spencer's (1855) *Principles of Psychology*, but Godfrey–Smith over-emphasizes James's criticisms of Spencer to the point of placing James and Spencer in opposing "internalist" vs. "externalist" camps (Godfrey–Smith, 1996, pp. 90–94; pp. 169–171). James is counted as an internalist because of his emphasis on internally generated interests and his pragmatist-flavored arguments against Spencer on truth as correspondence. However, one seeks in vain in James's *Principles* and in the *Briefer Course* (1892/1985) for any discussion of Spencer on correspondence or pragmatic conceptions of truth.

What is most troubling about Godfrey–Smith on James is that he fails to distinguish the scientific naturalism of James's psychology from the pragmatism, and the commitment to metaphysics and the philosophy of religion in James's late work. The distinction is quite explicit in the work of James's student James R. Angell. (See, e.g., Angell, 1907, p. 68; where he rejects the equation of Jamesian functional psychology and pragmatism.) Along with reference to James's magnum opus, *The Principles of Psychology* (1890), readers will find Godfrey–Smith's references and quotations from James in James's *Pragmatism* (1907), *The*

[1] See my related arguments and the account of the contrast in H.G. Callaway (2024) *Functional Psychology and the Philosophy of Mind* and in the Introduction to my critical edition (2022) of James's *Essays in Radical Empiricism.*

Will to Believe (1897), *The Varieties of Religious Experience* (1902), and *Essays in Radical Empiricism* (1912). "The view of mind endorsed" in Godfrey–Smith's early book, *Complexity and the Function of Mind in Nature*, "combines elements from both the pragmatist tradition and from recent naturalism" (1996, p. 196). In the *Principles*, however, James emphasized that "It is highly important that this natural-science point of view should be understood at the outset. Otherwise more may be demanded of the psychologist than he ought to be expected to perform" (1890, Vol. I, pp. 183–184).

The combined appeals to Spencer, James, Dennett, and Nagel may seem puzzling to some, but less so if we see Godfrey–Smith as attempting to bridge the "explanatory gap" between consciousness and functionalism and understand James as advancing a scientific naturalism and a functionalist account of consciousness in his psychology — as contrasted with his later, more philosophical writings on metaphysics and the philosophy of religion. Contrary to Godfrey–Smith's claims of James's "internalism," in *Psychology*: *The Briefer Course* (originally published in 1892) and in the *Principles*, James credited Spencer as a major influence in the development of psychology as a science; and he quoted Spencer approvingly:

> The chief result of all this more modern view is the gradually growing conviction that *mental life is primarily teleological*; that is to say, that our various ways of feeling and thinking have grown to be what they are because of their utility in shaping our *reactions* on the outer world. On the whole, few recent formulas have done more service in psychology than the Spencerian one that the essence of mental life and bodily life are one, namely, "the adjustment of inner to outer relations" (James, 1892/1985, pp. xxvii–xxviii; cf. James, 1890, Vol. I, p. 6; Spencer, 1855, p. 374)

To defend a Jamesian, functional approach against Godfrey–Smith's charge of "internalism," two points are needed. (1) We need to adopt a version of the thesis that interests, which often drive attention, belong to our reactions to the world. They arise from a psychological competition. (See, e.g., Dehaene, 2014, p. 13 on "fame in the brain.") (2) It is important to distinguish Jamesian functional psychology from his later metaphysics, pragmatism, and philosophy of religion.[2]

Internalism and Externalism on Language and Consciousness

Noam Chomsky on the origin of the human language faculty contributes to Godfrey–Smith's paradigm of the "internalist." Godfrey–Smith's statement of the opposition between internalist and externalist views is found in his earlier

[2] It is worth emphasizing that many or most scholars of James's work are more interested in his later philosophical writings starting with James in 1897 and his controversial claims for the will to believe. James's later interests strongly turned to the philosophy of religion.

writings (1996, pp. 39–40). In that book, Godfrey–Smith discusses James and Chomsky; and according to Chomsky, far from having a scientifically accepted, gradualist, adaptationist and evolutionary origin and explanation, "... the processes by which the human mind achieved its present stage of complexity and its particular form of innate organization are a total mystery..." (Chomsky, 1972, p. 97). Chomsky argued that evolution has little to say about the origin of the human language faculty, and that,

> The answer may well lie not so much in the theory of natural selection as in molecular biology, the study of what kinds of physical system can develop under conditions of life on earth and why, ultimately because of physical principles. (1988, p. 167)

We understand better the common emphasis on continuity by looking to what *kind of view* is being rejected, e.g., the claims in Chomsky's writings on the origin of human language and related criticism of the proposed contemporary, neo-Darwinian, synthesis. (See, e.g., Eldredge and Gould, 1972; and Gould, 1980. Early criticism of S.J. Gould's revisionist proposal can be found in Dennett's 1983 paper, "Intentional Systems in Cognitive Ethology.")

Not only does Chomsky make acquisition of a particular natural language dependent on an innate language "organ" or human language faculty, a claim that many find plausible, he doubts and rejects the thesis that the human language and mind arose by Darwinian natural selection. Correspondingly, to make of William James as an "internalist" is to read his later pragmatism concerning truth into Jamesian psychology — ignoring James's expressed allegiance to Spencer on psychological adaptation of "inner" to "outer" relations.

Godfrey–Smith supports an analysis of the "role" or function of mind in nature. "The function of cognition," he holds, "is to enable the agent to deal with environmental complexity" (1996, p. 1). In place of the classical, Aristotelian version of teleological explanation, he adopts a "teleonomic" concept of biological and psychological functions involving a reconciliation (and the commonalities) of the contemporary views of philosophers Larry Wright and Robert Cummins (see Wright, 1973; and Cummins, 1975.) Following Wright, what distinguishes the function of an organ, such as the heart, from its various and sundry effects is explanatory salience. In a more recent book, summarizing the theme of "Function and Teleology," Godfrey–Smith includes Dennett's intentional stance — according to which we "pretend" or adopt the useful "stance" that evolved systems have a designer — among the varieties of teleonomic, functionalist philosophies (Godfrey–Smith, 2014, pp. 59–65; on Dennett's "intentional stance," p. 61). But while Dennett does defend a version of functionalism, he is widely regarded as a skeptic or "eliminatist" concerning conscious experience. As Margaret Boden has put the point, "a common response to his provocative book of 1991 is: 'Not *consciousness*

explained, but *explained away'"* (2018, p. 115). Or, note Dennett in his last book, *I've Been Thinking*, he wrote: "I'm what you get when you cross a Quine with a Ryle" (Dennett, 2023, p. 67). Note, too, that behaviorism is a form of externalism, and that Godfrey–Smith does not endorse behaviorist versions of externalism.

Regarding Dennett on the "notion of the transmission of memes," Godfrey–Smith is more skeptical (2016a, p. 230n). This skepticism enters into doubts on Dennett's model in *Consciousness Explained* (1991), since that model "does not make use of efferent copies" (Godfrey–Smith, 2016a, p. 230n). Consciousness depends on a "loop" and feedback from action to sensory inputs and vice versa (2016a, pp. 79–84). In this way, animals respond differently to changes in their local environment due to their own activities vs. changes which arise independent of their own activities. Implicitly, at least, this marks a differentiation of self and non-self. It enters into Godfrey–Smith's emphasis on *subjective* experience. But it is not entirely clear that mechanisms involving feedback loops are sufficient for subjective *experience*. We may wonder whether Godfrey–Smith's talk of "subjective experience" is a matter of *experience* — as contrasted with nonconscious interaction.

In his *Complexity and the Function of Mind in Nature*, Godfrey–Smith registers a preference for Dennett's "instrumentalism" of the intentional stance (1996, p. 193). He seems to be led astray on James by following Dennett's externalism too closely. Note that Dennett's writings display no significant interest in the phenomenon of blindsight,[3] and the lacuna chiefly carries over to Godfrey–Smith. While there is a relevant discussion of the work of David Milner and Melvyn Goodale in *Other Minds* (Godfrey–Smith, 2016a, pp. 87–91; cf. Goodale and Milner, 2005), their conclusion regarding nonconscious dorsal stream processing is left standing and unrefuted. In an endnote, Godfrey–Smith is content to suggest that "conscious experience" may not be a "yes or no matter" (2016a, p. 222). What one finds in Dennett's (2021) writings are claims for what he calls "illusionism" regarding consciousness. If conscious awareness is indeed an illusion, then any proposed contrast between conscious visual awareness and blindsight becomes moot.

Alien Minds and Evidence from Ethology

A fascinating feature of Godfrey–Smith's work is his devotion to the study of the various species of octopus (and other cephalopods), and the contrast with standard biological paradigms of mind, intelligence, and consciousness. The octopus is a very distinctive and intelligent animal. In evolutionary terms, it is also

[3] According to the American Psychological Association's *Dictionary of Psychology,* blindsight is "the capacity of some individuals with damage to the striate cortex (primary visual cortex or area V1) to detect and even localize visual stimuli presented to the blind portion of the visual field. Discrimination of movement, flicker, wavelength, and orientation may also be present. However, these visual capacities are not accompanied by conscious awareness."

quite distant from the human species. The last common ancestor it shares with human beings goes back some 600 million years; and that animal was likely a "flattened worm-like creature" (Godfrey–Smith, 2016a, p. 4; see also Godfrey–Smith, 2020, pp. 127–128). "The human-octopus ancestor lived at a time when no organisms had made it onto land and the largest animals around it might have been sponges and jellyfish ..." (Godfrey–Smith, 2016a, p. 8). The various species of octopus are most closely related to a subaltern class of marine mollusks. (The broader phylum of mollusks also encompasses clams, shellfish, and snails.) The narrower class of marine mollusks includes the octopus, the nautilus, cuttlefish, and squid; and the octopus is believed to descend from an evolutionary ancestor, which like the still existing nautilus, was protected by a hard shell.

Giving up a protective shell made the octopus capable of more extensive movement and hunting; but given its soft, boneless, invertebrate body, it became more vulnerable to predation. In consequence, most species of octopus are short-lived. Because it is highly subject to predators, longevity has not been selected for. It reproduces by laying very large numbers of eggs on a single occasion, and this contrasts with comparatively long-lived species which reproduce with smaller numbers of offspring, but repeatedly over an extended period of time. The evolutionary development of high levels of intelligence in the octopus and their mastery of camouflage are adaptations to their high vulnerability to predation. Godfrey–Smith puts it this way: "An octopus can't expect to live a long time, especially as they must be active as predators themselves."

> They can't just hide in a hole and wait for food to come to them. They have to be out and about, and once in the open they are vulnerable. This vulnerability makes them ideal candidates for the Medawar and Williams effects to compress their natural lifespan; a cephalopod's lifespan has been tuned by the continual risk of not making it to the next day. As a result, they have ended up with their unusual combination: a very large nervous system and a very short life. They have the large nervous system because of what those unbounded bodies make possible and the need to hunt while being hunted; their lives are short because their vulnerability tunes their lifespan. (Godfrey–Smith, 2016a, pp. 173–174)

In accordance with the Medawar and Williams effects (Medawar, 1952; Williams, 1957), genetic variations favorable in early life and supportive of reproduction will accumulate even when they have unfavorable consequences in later life after the optimal period for reproduction — and thereby produce the phenomenon of aging. "Female octopuses, in general, are an extreme case" writes Godfrey–Smith: "they die after a single pregnancy"; and "when the eggs hatch, the larvae drift off into the water. Soon afterward the female dies" (2016a, pp. 170–171). The male octopus typically dies shortly after depositing its semen.

The distance of the octopus on the tree of life from the more familiar, mammalian paradigms of animal intelligence tells us that natural selection has produced

high levels of intelligence — more than once — on separate branches of the tree. As the author formulates the point, "evolution built minds twice over"; and "This is probably the closest we will come to meeting an intelligent alien" (Godfrey–Smith, 2016a, p. 9). Similarly, he remarks that "Vertebrates and cephalopods separately evolved 'camera' eyes" (Godfrey–Smith, 2016a, p. 219n; cf. Randel and Jékely, 2016).

With vertebrate species it is generally possible to identify distinctive structural features of the brain and map them across species. But mapping from the vertebrate brain to the cephalopod brain is not possible. One of the distinctive features of the neurology of the octopus, for example, is that the arms have each their own semi-modular "brain"; and the arms, even when detached, are capable of a range of independent behavior. (Godfrey–Smith, 2016a, p. 51.) The partly distributed configuration of neurophysiology and intelligence is suggestive of an analogy with "federal" forms of organization based in semi-autonomous agency (Godfrey–Smith, 2016a, p. 103).

The evidence of high levels of intelligence in the octopus and others in their class of evolutionary kin is hard to ignore. In general, the comparative estimates of intelligence are based on observation of the subject's behavior. However, Godfrey–Smith seeks to understand the intelligence of the cephalopods in the context of the philosophical problem of "the relation between mind and matter," viz. "How do sentience, intelligence, and consciousness fit into the physical world?" He aims to "make progress on that problem, vast as it is"; and wants "to know how consciousness arose from the raw materials found in living beings" (2016a, pp. 9–10).

> Aeons ago, animals were just one of various unruly clumps of cells that started living together as units in the sea. From there, though, some of them took on a particular lifestyle. They went down a road of mobility and activity, sprouting eyes, antennae, and means to manipulate objects around them. They evolved the creeping of worms, the buzzing of gnats, the global voyages of whales. As part of all this, at some unknown stage, came the evolution of subjective experience. For some animals, there's something it feels like to be such an animal. (Godfrey–Smith, 2016a, p. 10)

According to Godfrey–Smith, the "smart" animals are "the ones with large brains, who are complex and flexible in their behavior" (2016a, p. 7). However, consciousness and high levels of intelligence are late arrivals in evolutionary histories; "sentience" came earlier; and "... if it feels like something to be a squid or octopus, then these are *sentient* beings. Sentience comes before consciousness" (2016a, p. 79). Godfrey–Smith's concepts of sentience, consciousness, and "what it is like" to be a particular animal expresses a version of functionalism — akin to the Darwinian, functional psychology which developed from James's *Principles of Psychology*. "Consciousness surely did not," as James argued, "suddenly irrupt into the universe fully formed" (2016a, p. 77; cf James, 1890, Vol. I, p. 148). Godfrey–Smith

counts consciousness as a developed form of sentience. One might also note that in accordance with Jamesian functional psychology, "Consciousness may not uselessly exist" (James, 1890, Vol. I., p. 142).

Having a large brain and complex, flexible behavior are features of many animals including chimps and dolphins, dogs and cats, along with humans and some birds such as crows and parrots. In operant conditioning experiments, it was found that the octopus could be trained to press a lever to get rewarded with a morsel of fish (see Dews, 1959). It is known, though, that habits established by operant conditioning are possible in blindsight (Weiskrantz, 1997, pp. 11–12; cf. Passingham, 2016, p. 22 and Koch, 2004, p. 220 on blindsight). However, since this depends on close temporal pairings, i.e., coincidence-based conditioning, the implication is that operant conditioning does not reflect or capture the higher levels of cognition as reflected in memory-trace conditioning (Dehaene, 2014, pp. 102–103).

Moreover, the experiments mentioned by Godfrey–Smith did not confirm the basic assumptions of operant conditioning. Some of octopus behavior appeared spontaneous and unrelated to known rewards or punishments. In consequence, "one message of octopus experiments is that there is a great deal of individual variability" (2016a, p. 54). Not every octopus started with the same (presumed) species-specific behavioral routines, and some animals took to squirting water at experimenters, or otherwise disrupting the experiments. That indicates an "octopus with a particularly feisty temperament" (2016a, p. 54).

"Another octopus behavior that has made its way from anecdote to experimental investigation is play — interacting with objects just for the sake of it" (Godfrey–Smith, 2016a, p. 59; cf. Mather and Anderson, 1999 and Kuba et al., 2006). Play is indicative of intelligence, since it illustrates behavioral plasticity and escape from rigid, instinct-bound patterns of reaction to objects in the immediate environment. An octopus will initially examine a novel object to see if it is eatable. However, if it is not an item of food, this does not mean that it is uninteresting. Play and exploration of novel objects exemplify complex and flexible behavior. "Some individual octopuses — and only some — will spend time blowing pill bottles around their tank with their jet," or "'bouncing' the bottle back and forth on the stream of water coming from the tank's intake valve" (Godfrey–Smith, 2016a, p. 59).

"Other octopus manipulations of foreign objects are done for more practical reasons" (Godfrey–Smith, 2016a, p. 59). Godfrey–Smith reports on research conducted in Indonesia which involved octopuses in the wild carrying around pairs of half coconut shells for use as portable shelters:

> The shells, neatly halved, must have been cut by humans and discarded. The octopuses put them to good use. One half-shell would be nested inside another, and the octopus would carry the pair beneath its body as it "stilt-walked" across the sea bottom. The octopus would then assemble the halves into a sphere with itself inside. A wide range of animals use found objects for shelters (hermit crabs

> are an example), and some use tools for collecting food (including chimps and some crows). But to assemble and disassemble a "compound" object like this, and put it to use, is very rare. It's not clear what to compare this behavior to, in fact. (Godfrey–Smith, 2016a, p. 64)

In spite of the example of complex tool use (see Finn et al., 2009), the psychologist Nicolas Humphrey (formerly a graduate student of Weiskrantz at Oxford) counts to the critics of Godfrey–Smith on the claimed sentience of the octopus: "... octopuses are not qualiaphiliacs, they are not natural psychologists, they don't regard each other as selves, nor do they care. I'm bound to say therefore that the likelihood of their being sentient and having a phenomenal self is negligible" (Humphrey, 2023, pp. 205–206).

The distributed mode of neuroanatomy of the octopus arose in connection with its mastery of camouflage. This is the ability of the animals to sense and blend into the background of its immediate environment by means of modifications of features of its skin. The animals make themselves look like a rock or, say, clumps of vegetation. Since the octopus is colorblind, the highly developed means of camouflage remain a subject of study, though sensing of the immediate background is evidently a function of the skin and arms. Changes in the apparent colors and texture of the skin also play some limited role in intra-species signaling. (On signals used by octopuses in agonistic interactions, see Scheel, Godfrey–Smith, and Lawrence, 2016.)

Signaling is perhaps best illustrated in mating behavior of the cuttlefish: the females display a white stripe on their side — indicative of their resistance to mating, and the stripe is imitated by smaller, female-impersonator cuttlefish which thereby evade the aggression of dominant males guarding access to favored females. Godfrey–Smith remarks on the highly developed means of possible communication combined with very little apparent uptake by other members within any particular cephalopod species. Lack of fuller communications, as contrasted with large-brained animals living in familial and social groups, coincides with the absence of extensive social relations in the cephalopods. Godfrey–Smith makes a case for octopus consciousness, and for many it is convincing. On his approach, this implies differentiation between self and non-self — and the presence of "subjective experience." A contrary argument is that an animal's factual differentiation between stimuli dependent or independent of its own actions is merely one contributing component of sentience and "what it's like to be" that animal.

Blindsight, Subjective Experience, and Consciousness

Godfrey–Smith's writings lack for any extensive discussion of the experimental phenomenon of blindsight, though it would be helpful in his treatment of the character and origins of subjective experience. Regarding vision in particular, much evidence of nonconscious mental processing arises in connection with

the phenomenon of blindsight (see Weiskrantz, 1997). Godfrey–Smith (2016a, p. 144) does attend to the related literature on object constancies in perception, but though the neurological mechanisms of object constancies do help guide action, these mechanisms, in possible contrast with their effects on conscious actions, do not appear in consciousness. Aiming for an account of the evolutionary origin of subjective experience and "what it's like to be" a particular organism, a distinction is proposed between subjective experience and consciousness. On Godfrey–Smith's view, as we have seen, subjective experience arose much earlier than consciousness; and this has the curious consequence that subjective experience is not always conscious. "I see consciousness as one form of subjective experience, not the only form" (2016a, pp. 78–79). In accordance with this distinction on offer, consciousness is a late arrival in evolutionary history, and subjective experience arose much earlier — in "the Cambrian" (2016a, p. 97).

An objection to this view is that for Godfrey–Smith pleasure and pain though exemplifying subjective experience and occasioning action, are, *evidently*, conscious phenomena. Instead of accepting "consciousness" as the comprehensive term, encompassing subjective experience, consciousness is regarded as a highly developed, derivative form of subjective experience with reference made to (and an objection made against) the theories of consciousness in the work of Bernard Baars, Stanislas Dehaene, and Godfrey–Smith's CCNY colleague, Jesse Prinz (see Baars, 1988; Dehaene, 2014; and Prinz, 2012).

For Godfrey–Smith, "The older forms of subjective experience" are "linked to the primordial emotions, pain and pleasure, feeling that must be acted on" (2016a, p. 96). The suggested approach is that subjective experience developed out of the prior evolution of biochemical mechanisms of organisms' attraction to, or avoidance of, features and elements of the immediate environment — including activities of organisms such as bacteria — which lack for subjective experience. "In animal evolution, along with the sheer elaboration of sensing and acting, there's the evolution of new kinds of connection between these activities, especially connections that loop, that involve feedback" (Godfrey–Smith, 2016a, p. 79). Goal-directed activity belongs to the evolutionary roots of subjective experience, and this thesis corrects and contrasts with the frequent, contrary focus on receptivity in isolation from associated activity.

Blindsight is usually understood to be a matter of "non-reflexive visual functions in response to stimuli that are not consciously seen" (Stoerig, 1999, p. 89); and "the phenomenon of blindsight as a processing of visual functions that is not consciously represented has been established in both human and monkey (Stoerig and Cowey, 1997, p. 535). Godfrey–Smith does *mention* blindsight and emphasizes related theory in an article published in 2016. He explains the "latecomer" theory of consciousness, which he opposes, as follows:

> The "dual stream" model of vision developed by David Milner and Melvyn Goodale posits two paths by which visual information is processed in the mammalian brain, of which only one, the "ventral stream," leads to experiences felt as vision. Ventral stream vision functions in the recognition of objects. The dorsal stream handles basic navigation and tasks such as reaching, and does so in a way that can produce effects akin to "blindsight ...." Milner and Goodale distinguish basic sensori-motor abilities from actions based on the construction of an "internal model" of the world, and they associate visual experience only with the latter. "Global workspace" models of consciousness developed by Bernard Baars, Stanislas Dehaene, and others, along with views of consciousness based on sophisticated forms of memory and attention, also appear to motivate a latecomer view, as they all associate consciousness with capacities that go well beyond the mere ability to sense, act, and remember. (2016b, p. 499)

Though there is this much room for scientific doubts on the early arrival of "conscious" subjective experience in Godfrey–Smith (2016b), elsewhere the thesis and related claims are put forward with greater positive force: "Ten years of following octopuses around ... have left me with no real doubt that octopuses experience their lives," and "they are conscious in a broad sense of the term" (Godfrey–Smith, 2020, pp. 146–147). What the scientific evidence clearly supports is high levels of intelligence in the octopus, and presumably similar levels of intelligence arose early on in the evolutionary history of animals. But these points leave plenty of room for scientific doubt that "conscious" subjective experience arose early on. Even supposing that octopuses "experience their lives," and that subjective experience, like camera eyes, evolved more than once and independently, it is less clear that early animals of the Cambrian era had any form of conscious, subjective experience. One might reasonably suppose, for instance, that pain behavior evolved first in the governance of mobility and that conscious pain came much later. This hypothesis would better align with the work in cognitive psychology such as that of Baars and Dehaene.

Among more critical perspectives deserving of Godfrey–Smith's attention, the writings of Michael Gazzaniga and his students figure prominently (see Gazzaniga, 2015, pp. 176–177). However, the evidence for and against blindsight and its broader implications is mixed, and blindsight is not found in every patient suffering V1 lesions in the occipital lobe (see Gazzaniga, 1985, pp. 120–124; Holtzman, 1984). Though many of the studies of interest were published early on — in the 1970s and 1980s, it is worth asking how to explain both the presence and absence of blindsight in different patients on the basis of preserved neurophysiology. The account of blindsight in Milner and Goodale predicts more uniformity.

Of interest, in contrast with Godfrey–Smith on consciousness, is a kind of hypothesis to the effect that forms of consciousness involve several contributing features which each evolved gradually and separately and that only the combination of these features engenders phenomenal consciousness. By analogy consider the proposal of the biologist W.T. Fitch who takes a gradualist, neo-Darwinian

approach to the uniquely human, genetic basis of the language faculty (see Fitch, 2009). Fitch distinguishes three components of the human language faculty: (1) imitation, (2) semantic reference, and (3) recursion. He puts forward the hypothesis that though none of the three is unique to human beings, their combination is unique. This allows that each of the three factors evolved separately and gradually, and that the genetic basis of human language arrived with the co-presence and coordination of all three.

In a similar way, we might suppose that subjective consciousness arose from several components which evolved separately; and it may be that Godfrey–Smith in his linking of subjective consciousness to metabolism has already identified several contributing components. For example, "When the genome is used to adaptively control the synthesis of metabolically important chemicals by tracking conditions in the environment," he writes, "that is proto-cognitive in the sense I have in mind" (see the discussion in Godfrey–Smith, 2016b, pp. 490–493). It is not claimed that all animals possess conscious, subjective experience. The argument for distinguishing those that do and those which do not partly turns on observation and experiments focused on pain behavior of contemporary animals. This includes controlled experiments showing a preference of some injured animals for environments containing pain relievers (Godfrey–Smith, 2016a, pp. 94–95; cf. Elwood, 2012 and Eisemann, 1984). But pain behavior may disassociate from the experience of pain in some animals; moreover, supposing that some contemporary animals experience pain, it does not follow that their ancient, Cambrian precursors did. "For a defense of a latecomer view of pain itself," Godfrey–Smith recommends Key (2015).

Part of the argument for the early arrival of subjective experience is developed by analogy with results in the study and use of computerized, "tactile visual substitution systems" (Bach-y-Rita, 1984; see also Bach-y-Rita and Kercel, 2003; Deroy and Auvray, 2012). If a camera is employed by blind patients to feed a pattern of tactile stimulation to the patient's back, then this results in *perception of objects* in the sensory environment (not mere patterns of tactile sensation) only if the patient is able to exercise some active control over the camera, that is, "to act and influence the incoming stream of stimulation" (Godfrey–Smith, 2016a, p. 80). The perception of objects in the environment depends on being able to distinguish between changes which arise from the agent's own activities and those which depend on other changes in the perceptual environment; and this implies some differentiation between self and non-self. The idea is, again, that subjective experience arose with, and depends upon, feedback loops that link an animal's activities back to the senses. Supposing that the presence of feedback loops is a necessary condition of subjective experience, though, it is much more doubtful that it is sufficient. There seem to be some other components, beyond feedback loops — (plausibly) "computation" at a metabolic level, a larger brain and higher levels of intelligence, intra-species signaling, and social life.

Conclusion

The work and good efforts of Peter Godfrey–Smith on the resolution of the "explanatory gap" between subjective experience and the natural sciences contributes much of value to cognitive psychology and related fields of natural science. He goes well beyond the simple suggestion that continued research on detailed problems of cognitive psychology and cognitive neuroscience will result in the so-called hard problem simply dissolving. As argued above, his proposals that consciousness is a special case of subjective experience and that subjective experience arose very early in evolutionary history are less plausible — as scientific hypotheses. Greater attention to the phenomenon and evidence of blindsight may help by re-enforcing the important theoretical distinction between sensory–motor intelligence and animal consciousness. Supposing the octopus enjoys subjective experience, as Godfrey–Smith has argued, it remains reasonable to suppose that its Cambrian ancestors developed only varieties of sensory–motor intelligence: that they were more like philosophical "zombies"; and that other needed components of sentience and consciousness arrived much later. Godfrey–Smith is yet to rule out this viable alternative.

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