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Consciousness: Sentient and Rational

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The evolution of nervous systems culminating in human consciousness might best be studied through an analysis of wakefulness and its constituent functions of sentience and cognition. The operative assumption in this model is that wakefulness emerged at the dawn of phylogeny and has been successively in-formed by an increasing complexity of sensory and cognitive functions. Wakefulness constitutes the essence of human consciousness but the cognitive and sentient functions complicate the analysis of the forms of awareness afforded to lower species. Folk psychology is recognized as a proper starting point for the analysis, as against a philosophical behaviorism that dispenses with the supposition of infrahuman sentience. The concepts of a dim awareness and instinctive automatisms, hitherto applied to non-human animals, are shown to confuse the dimness of primitive sensory and cognitive processing with a phylogenetically invariant wakefulness that, by hypothesis, cannot be attenuated in any species. Mundane behavioral evidence from infrahumans must remain the touchstone by which models of consciousness are to be assessed, not any program interpreting empirical evidence to the end of outlawing phenomenal experience in humans or infrahumans.

Keywords: animal consciousness, human consciousness, phenomenology

"Animals are pure machines": An opinion so absurd has never gained admittance among philosophers, except as the play of wit or as a philosophical pastime . . . . Experience gives us no less proof of the faculty of feeling in animals than of feeling in men . . . .

La Mettrie, 1748

<Dismissively in debate:> My dog is not conscious.

Hillary Putnam, c. 1990s at a Michigan State University debate

There are two points readily propounded by folk psychology, at least when its expression is unperturbed by doctrinaire philosophy or behaviorism. Infrahumans are said to have wakefulness as we have and to feel pains; and though many have some higher degree of understanding they have not the capacity for reason.

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Now these presumptions are admitted as intuitively agreeable, yet in fact are unobjectionable only when taken separately, each in isolation. For when we join the two, we see a contrariety or paradox arise, inasmuch as folk psychology appears to affirm implicitly or explicitly that reason is that which generates or is somehow responsible for our wakeful awareness ("human consciousness"). Man alone possesses reason, while infrahumans do not have it; hence our consciousness — "awareness" — seems somehow an effect of, or at least necessarily bound up with, reason-able thought. Human consciousness is a function of our rational faculty in some subtle or unspecified manner. (Folk psychology appears not to posit an *identity* between reason and waking awareness. But intuitively there is the hunch that they are almost inextricably implicated in each other insofar as reason "brings all things to light" and makes us "consciously aware" of so much that cats, dogs, and cows, let alone insects, are constitutionally oblivious of.)

The fact of our unique possession of reason makes us think that, because lower species do not have our superlative intellect, therefore they cannot possibly have (certainly *our*, or perhaps *any*) "consciousness" either. When we bring those two posits otherwise agreeable to our folk psychological sentiments (namely, humans are unique by dint of our reason, and infrahumans are evidently sentient if not "fully" conscious), they inevitably clash. We have rational understanding but lower animals do not, and insofar as reason "somehow" seems to be responsible for our conscious awareness, animals cannot have conscious awareness because their "thoughts" are not informed by reason.

Again, this paradox arises only when those two otherwise innocuous and acceptable posits are juxtaposed. I do not wish to justify them in isolation (I accept them as bald folk psychological axioms), but to show how we can reconcile the two in conjunction, and overcome the paradox. We may justifiably ascribe wakeful awareness to infrahumans but concomitantly deny them the depth of understanding called reason in humans. In doing so I intend to studiously table the "philosophical" (reductionist or behaviorist) elaborations that have been bestowed upon the issue of animals' "awareness," except to the extent of showing *passim* where and how they might go astray.

The puzzle that animals are both "aware" (possess sentience) and yet are "not aware" (have not cognition beyond a "dim" capacity for primitive abstracted relations) may initially be treated and resolved as a fallacy of equivocation, respecting "awareness" as the pivot term causing a fallacious inference. This may be true so far as it goes, although it does not quite resolve the problematic insofar as that verbal equivocation is merely reflective of a deeper conceptual confound that must be addressed. Here we are considering the actual functions or phenomena of cognition, sentience, and wakefulness, which have not been properly sorted out by folk psychology or perhaps even (especially?) by extant philosophy of mind.

I proffer the following categories as approximations to, or ramifications of, the necessarily unrefined and inherently vague folk formulations. There are at least six fundamental functions or phenomena in question, to be referenced for resolving folk psychology's paradox respecting animals' "awareness" that is qualitatively distinguished from ours:

> *Wakefulness*: the alert state mediated neurally by arousal mechanisms such as the reticular formation; heuristic functional characterizations are also possible (Koella, 1967);
>
> *Sentience*: the informing of wakefulness (humans' or infrahumans') by sensory modalities and by perception;
>
> *Understanding*: the cognitive capacity informing wakefulness that among other things conceptually abstracts, at whatever level of species-characteristic intelligence, and has developed stupendously through phylogeny to culminate in reason;
>
> *Consciousness*: reason's informing of wakefulness, applicable only to humans;
>
> *Attentiveness*: focused wakefulness, directed toward perceptual or conceptual foci of interest to the organism, which permits of relatively focused concentration of a narrow or broad compass depending upon the species in question;
>
> *Wakeful luminosity*: by this virtually self-explanatory metaphor is designated simply the qualitative awareness normally afforded to awake animals; ostensively and heuristically, it is experienced at the moment of awakening from sleep with its immediate emergence of arousal, alertness, and sensory awareness.

The term "awareness" is inherently vague, signifying by turns understanding, sentience, or wakefulness. Nonetheless it may be used serviceably whenever stipulation is made as to which form of awareness is meant, as with "sentient awareness." Finally, "self-consciousness" is a still further category requiring extended analysis that cannot be done justice within the confines of this essay. Suffice it to say at present that I believe it is compounded of wakefulness, reason, and a scheme of self-identity (the Kantian unity of apperception).

The deduction that animals cannot be conscious inasmuch as consciousness is conceptually, terminologically, and essentially assigned uniquely to humans, is a fallacious conclusion illicitly exploited by those such as Descartes and Dennett

(1991), as shall be shown below. My suggestion is that the folk presumption of animals' "dim awareness" applies principally to their sensoria and cognitive understanding, while concurrently I grant them "full" wakefulness. Infrahumans are not "conscious" only in the sense that their wakefulness is not informed by the profound cognitive faculty called reason. Their dim understanding makes us presume erroneously that their wakefulness itself is dim.

This simple construct of consciousness hypothesizes wakefulness as its *essence*. I do not say there is an *identity* between wakefulness and consciousness because this latter is a species-characteristic *form* of wakefulness, namely ours, whose wakefulness is structured, informed, and directed by reason. This model of phylogenetically generic wakefulness, with consciousness as one of its subsumed (if highest) types, stands against the routine confound of folk psychology's, namely "consciousness" (implicitly construed qua wakefulness) as being unique to man. Crushingly obvious supporting empirical evidence for the essential nature of man's consciousness consisting in wakefulness is their simultaneous appearance upon awakening, an invariable co-incidence replicated for us every morning — though again, voles and iguanas wake up but do not awaken to conscious (rational) awareness and hence there is no identity between consciousness and wakefulness. Our phenomenal consciousness is, upon awakening, generally submerged immediately by attention (focused wakefulness) upon the sensory surround or perhaps is directed to cognitively mulling over plans and duties for the day. Once attentiveness shifts our waking focus to sensory and cognitive matters, wakefulness as such becomes the attentively invisible backdrop to those concerns for the day's duration.

There remains the oddity of "sleeping consciousness." Truly it is odd that during dreaming there should be a kind of (hallucinatory) multimodal sentience, replete with a cognitive component, namely, an unfolding dream plot. This is the REM sleep phase, whose neural parameters are similar to those of waking consciousness. So this is indeed "paradoxical sleep" in more ways than one insofar as there is present a truncated (non-veridical) or delimited conscious awareness, whose neural pattern approximates that of the waking state, yet whose phenomenal and cognitive contents generally cannot be recalled shortly after awakening, unlike the usual accuracy of our waking recall. The existence of such an experiential state does not make nonsense of the age-old sleep/waking distinction; it only blurs their respective boundaries paradoxically.

There is a simple and singular idea to be imparted by this essay. Sentience, understanding, and emotion have undergone development in phylogeny, from relatively "dim" to fully intensive and expansive forms, in which the cognitive and sentient functions have informed a "phylogenetically constant" wakefulness. The resulting species-characteristic psyches are expressed within myriad invertebrate and vertebrate species — evolutionarily tailored "minds" instantiated in those species' individuated members.

Blind Automata

This position, initially following folk psychology, is in contrast to Dennett's and the Cartesian notion (Descartes, 1637/1955) of infrahumans as insentient automata. Descartes's deduction to this effect was predicated upon his equation of mentality (including sentience) with reason, language, and an immortal soul. Dennett (1991) applies this same reasoning even to humans: we have merely a "false belief" that we are sentient or conscious (Crooks, 2003, 2004).

This presumption that we ourselves are "unconscious" is *conceptually* incoherent inasmuch as the very concept of unconsciousness (sleeping, anesthetized, or comatose states) derives from a privation of our waking state and has meaning relative only to its normative reference. Unconsciousness is possible only where consciousness has previously been operative. Second, there is certainly a *phenomenological* or experiential divide between the two states even if our waking moments are labeled false beliefs, for false beliefs (cognitions) are still qualitatively distinct from archetypal unconsciousness. Third, there are distinct *neurological* substrates for the waking and sleeping states; to posit otherwise is to make nonsense of elementary neuroscience. Fourth, Dennett adduces instances of distractedness to suggest the possibility of our own coherent behavior more generally being carried out "unconsciously." But distraction presupposes conscious wakefulness insofar as one's attentive direction is attuned to one thought or activity rather than to another. An unattended purposeful activity may express an automatism but the concurrently "attended" activity falls squarely within the conscious purview. Multitasking musicianship and dichotomic listening experiments (the cocktail party effect) so warrant and intimate this observation.

Wakefulness and reason are run together in our phenomenal experience. Our reason informs our waking deliberations and makes us cognitively aware of the sensory surround. But if wakefulness and reason are actually two distinct functions or phenomena that otherwise appear necessarily intertwined by their indiscriminate merging within apperception (internal awareness), then Descartes might well have confounded them indiscriminately as one. Following folk psychology's lead, he interpreted consciousness as informed by, and as a kind of function of, discursive reason. (Descartes is routinely classed as the supreme rationalist alongside Leibniz and Spinoza.) By this reasoning, infrahumans could not possess consciousness (wakeful awareness, inclusive of pain) because they do not possess reason. La Mettrie (1748/1912) believed that as animals are automata, and man's physiology is laid out on the same basis as animals', man himself must be a physiological automaton. Contra Descartes, though, La Mettrie did not deny sentience to animals, let alone to us.

Dennett's argument is that, first, mind is to be identified plausibly with the brain because of the wealth of established psychophysiological correspondences; then he concurs with Descartes that animals are insensate (because "consciously

unaware"); and inasmuch as man has the same fundamental physiological basis of life as do infrahumans, Dennett concludes that man himself has no consciousness, no qualia experiences in particular. This argument hinges upon a fallacy of equivocation, via the term "conscious awareness" (or its synonyms), within which "reason" and "awareness" are made illicitly interchangeable. Infrahumans have not reasonable consciousness; therefore they must not have "awareness," meaning they are insentient and even "unconscious" despite their seeming wakeful behaviors.

Dennett is in good company in denominating even us as unconscious. Carl Jung (1961) recounts his central African safari to wide savannah vistas and his solitary looking out upon "Creation's first dawn," in which he says human consciousness is required to make the objective world existent in the first place. In fact that idea is not original with him. It precisely mimics a passage in Schopenhauer's *World as Will and Representation* (1844/1969, p. 30); moreover, Jung states in his book that Schopenhauer was a major influence on his early intellectual maturation. Contrary to Jung, though, Schopenhauer avers that the objective world first came into existence, not with the opening of a ("conscious") human eye, but eons before our appearance, with an insect's opening eye, in other words with sentient and not rational representational awareness. Jung characterizes even the African natives as "unconscious," relative not only to the European but absolutely so. ("[Identity] is a characteristic of the primitive mentality and the real foundation of *participation mystique*, which is nothing but a relic of the original nondifferentiation of subject and object, and hence of the primordial unconscious state. It is also a characteristic of the mental state of early infancy, and, finally, of the unconscious of the civilized adult"[Jung, 1921/1971, par. 741].) Modern rationality is said to be the antithesis of this desirably more "unself-conscious" naturalness of thought and action; thinking devoid of rationality must then express a kind of unconscious state like that of the animals' (Jung, 1961, p. 269). This reminds us of Descartes's and Dennett's virtual equation of language and consciousness, insofar as language and rationality are very closely connected. Jung's implied construal of consciousness as supervenient upon rationality shows up his failure to heed his own constant admonitions against Westerners' treating rationality as the supreme psychological function. In other words, by making our modern "one-sided" consciousness a function of modern rationalism, he ascribes powers to rationality akin to Descartes's position.

In a related context, Jung (1961, p. 274) literally identifies consciousness with "human culture." Apparently what he means is that, prior to the advent of language, culture, rationality, and higher thinking as such, hominids were of a kind with the waking behavior and thought of mammals and even with that of neonates. Phylogeny and ontogeny of man counted for little respecting the capacity for (self-) consciousness until acculturation was able to transform our cognitive "unawareness" into the sociopolitical animals we are today. It can be

seen that this notion of consciousness springing from acculturation is just another expression of confounding wakeful awareness with rational thought and linguistic capacity.

By referencing neonates as an implicit model of unconsciousness, it may be suggested that insofar as we have no continuous memories before our third or fourth years, perhaps this is the intuition behind the presumption of unconscious humanity. In other words, we extrapolate from our inability as adults to recollect any continuity of self-consciousness from the time when we were toddlers. We infer that though we were awake and animated then, yet we must not have had the kind of consciousness we enjoy as adults — hence were "unconscious" in some unspecified fashion — as if there were no necessary connection between waking states and consciousness. (Certainly infants are devoid of reason, which would again suggest to a confused folk psychology that that lack of rationality implies lack of consciousness, as with the animals.) I doubt very much that toddlers are any less wakefully and sentiently aware than are infrahumans. Their obvious wakefulness, sentience, and curiosity are evidence of this, no less so than for the mature or immature animals. After our third or fourth years, due to maturation of the brain, presumably the neural substrate of memory becomes continuous enough to knit together varied experiences so that an apperception of self-identity can arise for the first time.

To sum up, it is ironic that, coming from that same premise regarding the physiological unity of life, but making a further posit of the undeniable existence of our phenomenology, we must impute minimally that same (sensory, hedonic) phenomenology to those infrahumans. This additional premise of phenomenology-affirmation is justified not only by the daily deliverances of our internal apperception but also because Dennett's phenomenology-denial is inherently self-contradictory (Crooks, 2003) and utterly at variance with known elementary neuroanatomy (Smythies, 2003).

We should make instead a proper bifurcation between wakefulness and reason. Mundane empirical evidence shows that understanding and wakefulness can be completely dissociated, as infrahumans are obviously devoid of reason, yet all mammals equally obviously show (discounting philosophical behaviorism's strictures) wakeful, sentient, cognitive, and emotive awareness. Wakefulness is then an equally necessary precondition along with reason for the diurnal or phylogenetic appearance of (human) consciousness. The contrary illicit reasoning lies in taking that concept of reason qua consciousness and, finding that infrahumans fall short of rationality, deducing that only we could have consciousness. This reasoning might be sound if we wished to restrict the meaning of "consciousness" to denote only our reasonable wakefulness; but it becomes unsound when, as is usual, "consciousness" becomes an implicit synonym for generic wakefulness and consequently animals are denied wakeful awareness simply because they lack our reason.

Language generation and comprehension are obviously implicate with our rationality. We have language to intellectualize our intentions, but it does not follow that this linguistic intellectualization is necessary or sufficient for an "inner" understanding of human or infrahuman purposive behavior. Far less is it the case that language is requisite for wakeful awareness itself (contra Dennett, 1991; cp. Jaynes, 1990), though indubitably it is necessary for fully rational thinking. (Language is certainly prerequisite for thinking conceptually, which is itself necessary for moral choice, without which an agent's responsibility becomes impossible. No one holds animals morally responsible for their actions — it is their owners who are neglectful or not of their charges' behavior.) The simplest explanation is given by folk psychology, namely, infrahumans are sentient and have understanding qualitatively removed from reason, but understanding nonetheless.

I suggest that wakefulness as such has remained essentially static in phylogenetic progression, as behaviorally illustrated by a more or less constant kind of responsive alertness had by all extant species; whereas cognition and other informing psychic functions have developed via the convolution and connectivity of their respective neural substrates. This argument assigns to all infrahumans minimally the capacities for wakefulness, sentience, and some form of "dim" comprehension fitted to their adaptive niches. As known to any "good Darwinist" (Dennett, 1995), all nervous systems have the same basic chassis devolved from the first appearance of life on Earth. We thus may use the identical biological evidence to come to a conclusion antithetical to that of the philosophical behaviorists ("reductionists") concerning the existence of infrahumans' possession of wakeful sentience with its panoply of sensory and hedonic phenomenology.

A Prolegomenon for Consciousness

The neuroscientist William Calvin (1990, p. 3) downplays the import of wakefulness in regard to the phenomenon of consciousness: "I don't mean consciousness in any superficial sense; important as it is, I'm not simply talking about the brain-stem region that controls sleep and wakefulness, nor am I only talking about cognition, how we become [cognitively] aware of something." Contrarily, it may be contended that wakefulness is the key to unlocking the essential nature of consciousness, at least as it unfolded in phylogeny and unfolds in ontogeny. To begin properly comprehending mind as it has developed on Earth, it is necessary to examine the wakeful "forum" or matrix within which sentience, emotion, and cognition have evolved, and the "proportionality" of all such integral functions within a given species-characteristic psyche.

Superficially construed, the wakeful state seems to involve the most unenlightening folk observation conceivable, namely the mundane distinction between waking and sleeping. Wakeful cognition and perception are simply the (unex-

plained) means whereby we become and remain "aware" of the immediate or clairvoyant surroundings. Such a simple analysis seems superficial only to those who do not properly discriminate among the total contents of human consciousness, among our highly developed reason, sentience, and conation within an apparently singular wakeful awareness. That totality indeed appears singular and mutually implicate from the unrefined first-person perspective.

If, then, a folk-directed neuroscientist tries to locate this unified consciousness in the brain, before the various functions therein have been antecedently distinguished and clarified — how then would a neural isomorph be found insofar as one does not know the composite structure that is to be sought and delineated? This confusion might well lead to futile searches in the brain for an approximation to the folk psychological model of undifferentiated "awareness," or doubtfully misapply the concept of our rational wakefulness (consciousness proper) down to the "awareness" of a salamander or worm in an expression of deliberate caricature.

Beginning with our rational wakefulness in the search for "conscious awareness," we thus are left at an impasse. But if we invert the order of investigation, starting with wakefulness near the opening of phylogeny, hypothesizing how it has become progressively informed by sentience and cognition, then we might plausibly reconstruct an evolution of mind, showing how higher functions have evolved from lower. This is said to be standard reductive method in biology (Churchland, 1986; Dennett, 1991), in the context of looking for mind and cognition's origins and their development through phylogeny. But if by evolution of mind we mean the emergence of inner and outer phenomenology, these are denied by philosophical behaviorism as "pictures in the head" (Crooks, 2008). Furthermore, certain reductionist accounts (e.g., Bickle, 2003) identify cognition with brain processes responsible for classical and operant conditioning, in effect portraying us as Dennett's humanoid automata.

Consciousness as construed in folk psychology is inherently nebulous for neuroscience research, as there is no coherent articulation of the psyche's various strands that might give clues to its model's psychophysical parallel in the brain. Trying to find that default folk isomorph within the most complex structure in the known universe will not be possible until a proper conceptual clarification and functional characterization have been formulated. We might first obtain the prerequisite conceptual orientation as to the components of our conscious reason: the developmental and structural interrelations of wakefulness, cognition, and sentience. Then we look for these functions' more rudimentary expressions at the dawn of phylogeny, e.g., bare sensorimotor control, and working upwards in evolution try to track their probable trajectory to our final *explanandum*, human consciousness. The neural correlates of these functions might then be sought more effectively.

The waking function is the fundament of consciousness, though wakefulness does not constitute its whole insofar as the psyche is further informed through phylogeny and ontogeny by cognition and sentience. Insofar as Calvin references lower brain regions responsible for the alternation of sleeping and waking states, this imports the evolutionary origin of wakeful awareness. Thompson (1985) cites the head ganglion of early worm species becoming the brain of the chordate-vertebrate line; from such primeval beginnings must have arisen the arousal system underlying life forms' early wakeful awareness. And if wakefulness arose in such primitive organisms, *ex hypothesi* discrete sensations have punctuated phenomenal awareness from earliest phylogeny — tallying with today's earthworm squirming in *visible* (behaviorally obvious) pain on a fishing hook, a metaphor of least common denominator infrahuman sentience. We recognize wakefulness both at the top of the phylogenetic hierarchy and also at its temporal origin. Properly we should begin at that earliest phylogeny, seeking wakefulness as such and its later expansions via sentience and cognition, which arise from more organized and complicated nervous systems.

Regarding neuroscience evidence, this hypothesis, treating wakefulness as being informed progressively by more developed sentience and cognition, appears completely supported by anatomical connectivities — hence appears coherent with reductionist neuroscience. The massive interconnections of the human neocortex with subcortical regions and nuclei are girded by the arousal system itself. Intermediate stages of neural evolution would show an infiltration by emerging cortical structures and projections into earlier neural centers (e.g., into the "R-complex"; Koestler, 1968; Sagan, 1977). Such interconnectivity would be the neural substrate of our rational perceptions, as with perceptual contents made interpretable by our conceptual categories (Crooks, 2011). To be "informed," neurally construed, means precisely this kind of neural ground of an otherwise airy folk psychological conception of human multimodal "awareness."

Because we have extant various species that appeared early in phylogeny, as with jellyfish, or at least have their relatively unmodified descendants from hundreds of millions of years previously (as with the chambered nautilus: see Stebbins, 1982), we can and do hypothesize plausibly concerning their species-characteristic psyches in the here-and-now by interpreting their behavioral repertory in light of their nervous systems' structures and functions. This collective evidence of behavior and nervous structure might afford the grounds for a good reconstruction of how mind developed in evolution. For example, planarians have specialized since their early ancestors; they and slightly modified descendants of early large-boned fish, amphibians, and molluscs might be used to extrapolate to their now-extinct progenitors, reconstructing their probable expanse of wakefulness, their cognitive and perceptual capacities.

Unconscious Instinct

When philosophical behaviorists such as Dennett so cavalierly talk about infrahumans as "blind" automata, this metaphor of blindness should be more minutely examined. Clearly there cannot be an intention to maintain infrahumans are literally blind, as animals are able to negotiate efficiently around visible obstacles as least as well as us. So it must mean one or more of the following: (a) in a behaviorist sense, infrahuman blindness means an unconsciousness of purpose for which actions are carried out, as spiders weaving and beavers building, i.e., without cognitive understanding or intention proper; (b) blindness in a positivist sense, implicate with physicalist monism, averring there cannot be existent any "ghostly" phenomenological entities, no "pictures in the head" except perhaps as non-causal, "epiphenomenal" imagistic byproducts of conditioning (Skinner, 1974); (c) blindness qua unconsciousness, i.e., "lacking conscious (wakeful) awareness" that we enjoy, apparently uniquely. (This last point raises the question as to animals' nominal wakeful state. For example, are "wakeful" beavers in a comatose yet ambulatory state, analogous to our sleep-walking? This illicitly compares privations of our consciousness with their waking states and treats both as aspects of the same functional "unconsciousness.")

It is anthropomorphic to ascribe our unconsciousness to infrahumans for at least three reasons. First, to ascribe our "dim" twilight states between sleeping and waking to infrahuman wakefulness confuses our wakeful nervous functions, phylogenetically highly developed, with (say) the primitive ganglia of arthropods that probably do not have such advanced (if dim) functions. Using a blanket term as "unconsciousness" for all infrahumans (Dennett, 1991; cf. Crooks, 2004) appears anthropomorphic because it may tacitly assume infrahumans have some "dim consciousness" or even complete unconsciousness, qua unconscious automata, hence have our complex (if privative) nervous functions and the psychology they subserve.

Second, to ascribe our unconscious states to lower species would be incoherent because animals have, relative to our central nervous system, structural and functional homologues subserving their own neurally distinct sleeping and waking cycle. In other words, to ascribe our sleeping or comatose states to wakeful infrahumans would confuse the fundamental division between an incapacitated sleepfulness and an alert wakefulness in such nervous systems, whether the nervous systems being compared are complex or primitive. Contrarily, it is appropriate to compare our waking states with theirs and our sleeping states with theirs, in light of such neural and behavioral parallels.

Third, there is the behavioral evidence itself. When we watch such a creature as an ant, spider, housefly, or honeybee, it seems to clearly "know" what it is about, what wakeful purpose it is aiming at. This is meant in the sense that these creatures certainly do not strike us as being somnolent, groggy, or akin to distracted human

adults, least of all as being delirious or comatose, though certain very simple creatures as planarians definitely evoke an impression in us that they are meandering with no particular direction or goal "in view," as with simple tropisms (kineses and taxes) and fixed action patterns. Most infrahumans take the path of least (purposeful) resistance straight to an object such as food, or directly away from noxious stimuli.

The telling irony is that philosophical behaviorists' refusal to admit pains, intentional actions, and sentient awareness to lower species is implicitly anthropomorphic because to deny such to infrahumans results in a default ascription to them of a kind of human unconsciousness. (By analogy, if beavers are not providential, per Dennett, are they then necessarily improvidential?) The heuristic of human sleep or unconscious states is being foisted unwittingly upon the animals. In fact, any kind of phenomenal ascription, positive or privative, must necessarily be anthropomorphic. It is the nature of the case that anything we feel or do not feel is characteristic of us.

Beyond philosophy and psychology, the casual inference seems to be that, because animals presumptively "don't know what they're doing" while and whenever they act, they must be lacking wakeful awareness. But such phraseology, supposing it proves anything, could just as well imply (for certain lowly animals) lack of foresight or clairvoyance, as much or little as it might imply the lack of any sentience or cognitive awareness of their surroundings or actions. (An apt moniker for Dennett's oblivious animal automata might be adopted from a 19th century American political party, the Know Nothings.)

Behaviorist psychology ideally does not use such terms as "painful" or "frightening" but only "avoidance" or "negative stimuli" because otherwise there might be an implication that infrahumans have feelings (Singer, 1975). Behaviorally or phylogenetically considered, the proper default (folk) interpretation is at right angles to the behaviorist scheme, namely, that infrahumans feel pain and have phenomenology "from the inside" as we do. Hence behaviorists themselves are violating explanatory simplicity by refusing to ascribe wakefulness and sentience to animals, in that very act of supposedly avoiding anthropomorphism.

> There are indications in both animal and human behavior that learning depends on setting up a unification of the total situation even when it cannot be surveyed as a whole. It is not necessary for the learning that an accurate picture [scheme or cognitive map] of the situation be achieved, only that the goal-concept dominate the phase sequence, and that each particular complex in the sequence corresponding to a correct run [within a maze] reliably evoke the next complex, with the resultant recognition of the direction of the next choice point. (Hebb, 1949, p. 135)

In the case of a simple invertebrate as a wasp or spider, each step of a behavioral sequence would be directed by stereotypical and schematically controlled directives following upon the receipt of unfolding sensory stimuli and motoric

feedback. With higher mammals, presumably their working-memory affords ample "apperception space" for an articulate overview of the end-purpose, as with a beaver building its dam. Such a comprehensive cognitive grasp of the total sensorimotor sequence would dominate the subordinate sequential activities, *improvised* and not rigid means ordered toward an expectancy goal. The beaver would have comprehensive insight as to the wherefore by which it acts at each subordinate step, just as humans do, though of course not having our cognitive reach but one that extends only to sensorimotor coordination under the direction of partially learned, partially native organizing schema.

Respecting the example of a wasp burying prey for its larvae, which when disrupted begins anew from the last step in sequential execution perserverating within an endless behavioral loop, Dennett (1978, following Wooldridge, 1968) argues this shows up its lack of purposive behavior. The wasp does not "know" what it is doing and executes its routines via a regimented "unconscious instinct." Perhaps in such instances of primitive invertebrates Dennett is essentially correct. A spider's providential understanding would not reach so far as the unfolding sequence of its weaving goes in its entirety.

If stimuli are repeated within a sequence, the wasp begins anew the pattern from the point of disruption perhaps because its short-term memory would be insufficient to overcome the interruption of fixed sequential schema. Alternatively, because its routinized pattern is so rigidified it might override any sensory and motor feedback to the contrary. But all that this might mean is that its "cognition" is underdeveloped relative to higher species' succeeding (or contemporaneous) in phylogeny. This admission in no way implies that dogs and beavers have no purposive understanding of their behavioral activities, despite Dennett's making no qualitative differentiation between weaving spiders and building beavers. Clearly the beaver's nervous system is incomparably more complex than spiders' ganglia; to lump them all together as generating one and the same amorphous and anthropomorphic "unconsciousness" is at variance with Dennett's (1991) own principle that increasing machine or biological complexity leads to consciousness by degrees. (Leech ganglia, involving on the order of ten thousand neurons, are now comprehensively understood in terms of their wiring and functions [Churchland and Sejnowski, 1992]. The same cannot at all be claimed with regard even to primitive mammalian nervous systems.)

Regarding any manner in which their actions are indeed incomprehensible to them, I suggest this is because their primitive cognition is incapable of understanding the *consequences* of what they are doing "by instinct" (by tropisms and fixed action patterns). If so, there would be not much comprehension given to invertebrates over and above the step-by-step sensorimotor coordinations they are able to effect. A supernumerary quota of cognition (or at least more short-term memory) might enable them otherwise to see the "final" purpose toward which their sequenced activities tend. With humans and higher mammals,

cortically-based directives monitor such unfolding behaviors and can modify or re-articulate them plastically according to feedback from environmental and sensory contingencies. With insects, most of their cognition would consist in earlier biological prototypes of mammalian fixed action patterns. But unlike mammals' capacity to plan ahead and retain memories of a scheme's partial execution, insects' interrupted sequences must start over again from the last point attained.

A beaver plans ahead, building according to scheme, and would be cognizant of the purpose given to each stage, what in our lingo is termed "consciously" (providentially) structuring varied natural means of wood, water, and mud towards an expected end. Conversely, an articulated and stereotyped plan (schema) would be hard-wired into insects' ganglia because that is all their nervous systems have room and wiring for (see Barnett, 1967 on stereotyped behavior versus "instinct"). With mammals, the schemata themselves become plastic, as articulated constructs can be generated *de novo*, serving as blueprints for improvised activities, whose means as intermediate to an end are "seen" or cognitively apprehended as sequentially purposive. With sufficient memory as that afforded to mammals, a species' intelligence approaches providential and clairvoyant cognition. A spider weaves blindly as to its purpose of a constructed web but beavers with their proto-reason work purposively at each step toward their constructed homes. Schemas can be hard-wired as with those of species that emerged early in phylogeny or they can become successively plasticized (quantitatively and qualitatively), with complex nervous systems supporting sufficient memory to learn from experience and through that experience to plan ahead more efficiently.

Narrowed Awareness

The behavioral evidence respecting infrahumans and notably the more spectacular expressions as thrashing and writhing in pain, even with the lowly earthworm, coupled with an extrapolation from our own "phenomenal insides," suggests animals' sentient, hedonic, and nociceptive (pain) awareness could not be dim at all. In light of such prima facie evidence, we might profitably replace the vague concept of animals' dim awareness with another more appropriate, namely a "narrowness" of their sentient and cognitive purview. Such narrowness references a circumscription of their faculties that does not suggest dimness akin to human consciousness petering down into sleep, with twilight states between waking and sleeping. Rather, they would have a more circumscribed sentience than ours, and certainly a far more constricted cognition because their cortical (not decorticated) deficiencies allow for such only.

Nevertheless, within that narrow range of their few and dim (attenuated) sensory faculties, everything experienced would be quite intense because the worm's

wakefulness would be "proportionate" to its delimited sensations. For example, when we see a worm writhe in pain, *ex hypothesi* its pain is "almost" as searing as ours insofar as its pain is being felt within an encompassing context of a "full" wakefulness perfectly adapted to the worm's sense modes, to its primitive sentience at that level of the phylogenetic scale.

Though infrahumans as amphibia and segmented worms certainly have only a narrow and imprecise discriminatory range of sensory and cognitive faculties relative to mammals', I wish to balance this observation with the contention that their wakefulness is proportionate to ours within those restricted ranges. I am suggesting that their sensations are situated within a wakeful compass that gives infrahumans a phenomenal experience qualitatively much as our own, despite the narrower sensory range.

Consider a worm slithering along. It has only a few primitive receptors facilitating heliotropism and nociception, yet it might have sensations within those few sense domains in relative intensity, *because that is all its similarly circumscribed wakefulness is attuned to, or directed towards, in its overall restricted purview*. Its cognitive and sensory purview is far more threadbare than ours, probably focused on only a few elementary sensations and very few motivations, including those for food, pain avoidance, and reproduction — a cramped appetition indeed. But within that narrow range of interests and "raw feels" the worm or insect might well suffer or enjoy very intense phenomenal sensations, as this hypothesis appears borne out by the behavioral evidence.

We might say infrahumans have a relatively narrow wakefulness or, perhaps, extending the trope, a wizened wakefulness *made* narrow by their severely attenuated sentience and cognition. This narrowness of purview is contrasted to our comprehensive wakefulness, informed by our dozens of finely discriminating sense modes and vast conceptual schemata built up through acculturation, informing the deliverances of those sense modes. (In other words, our own "capacious" waking state is suitably proportionate to our unmatched encompassing sensorium and cognition.)

What faculties inform wakefulness in which species? Again, from at least primitive invertebrates as insects or flatworms to some higher reaches of the phylogenetic scale, there is a capacity for pain, shown by behavior reactions as thrashing, writhing, struggling, and yelping. This elementary evidence necessitates positing a common, constant sentient awareness from early phylogeny, extending up to and including mammalian nervous systems and sensoria, reaching to man's perception and reason. What cognitively *informs* throughout the animal kingdom is species-specific intelligence, which pervades that phylogenetic constant of wakefulness — these are the cognitive functions properly construed as dim or otherwise. We assume, being ourselves informed by folk psychology, that "conscious reason" is somehow giving us our perceptual and cognitive awareness of the world, but nevertheless, *ex hypothesi*, bare qualitative wakefulness is had

by all nonhuman organisms. It is only a given species-specific understanding that is dim relative to our reason, further dimming as one descends in phylogeny.

But we need to qualify even the boundaries of sentient awareness that we might ascribe to those lower reaches of phylogeny (e.g., flatworms, sea slugs), because mammals have nervous systems boasting a far greater development, subserving more complex and varied sensory inputs and perceptual organization. Reasoning so, primitive organisms might well feel some kind of "elementary pain" — amorphous pains proportionate to the development of their simple ganglia — though paradoxically these nociceptive sensations would seem rather intense to them, given the presumption of their full-blown hedonic awareness. In any case, if there were no phenomenal "felt" pain had by them, then given such a maladaptive deficiency, species extinction would be guaranteed, as we know from human subjects pathologically devoid of pain reception and their consequentially short life spans. Certain species' sensoria, like their cognition, must be a relatively dim affair (amorphous and indiscriminating) due to an underdevelopment of their nervous systems, but these pitiable creatures in no way deserve the imputation, literally or figuratively, of sensory blindness.

It is paradoxical that philosophical behaviorism (or its equivalent mind/brain reductionism) should construe obvious behavioral signs of pain in animals as misleading and even "illusory." After all, behavioral criteria are those assumed as paramount in interpretation. One would be hard put to imagine a greater philosophical doublethink than these behaviorists' gainsaying innumerable empirical deliverances and maintaining (at least as a defensible intellective proposition, if not as a mundanely believable factoid) that the biblical beasts of the field are actually insentient in the face of this overwhelming evidence. The explanation for this confusion derives from the extant hegemonic philosophical behaviorism of Wittgenstein (1951) as interpreted by such of his influential disciples as Ryle (1949). There must not be any phenomenal residue of mind admitted beyond any fictitious conceptual "ghost in the machine" (consciousness) inherited, per Ryle, from Descartes. (Descartes, as detailed above, allowed consciousness only to humans, not to nominally insentient animals. Accordingly, it was disingenuous for Ryle to single out Descartes as a strong proponent of consciousness's prevalence.) The convolute behaviorist doublethink entails that one must (a) hold that behavioral criteria are fundamental empirical bedrock for interpreting infrahuman activities, while (b) concurrently denying that that empirical behavioral evidence means exactly what it obviously purports to mean.

Phenomenal Intensities

The heuristic notion of a dim consciousness applied to infrahumans is derived not only by extrapolating from our own somnolent experiences, but also from

the common observation that gives us a moral certainty that even the wretched worm must feel pains, hence by further deduction must be "awake" in some similar (if attenuated) experience to ours. Hedging our bets, we assume that because infrahumans are not as "fully" aware or "as conscious" as humans inasmuch as they do not have reason, they must experience some kind of intermediate state between complete insentience (as with a rock) and fully human consciousness, a "dim twilight awareness" that accounts at least for their obvious sentience. This picture is of an increasingly dim sentience, such decreasing sensory awareness and motor control becoming more "blind and automatic" as one goes down the phylogenetic scale, reaching at last such borderland instances as the jellyfish, before signing off with the indisputable insentience "endowing" plant life.

Meddis (1977) leaves earthworms unmentioned in his cataloguing of species that exhibit sleep cycles. Yet planarians are an ideal choice for theorization because they are so common, accessible to everyone's observation, and because they are the odd men out, being an extreme of phylogeny respecting the question of a cut-off point for wakeful and sentient awareness. The possible sentience (or at least wakefulness in some ultimate sense) of jellyfish and hydra baffles me but certainly worms show by manifest behavior clear instances of pain, demonstrating sentience, nociception, motility, and tropisms — thus at least a minimal link with our conscious awareness, once we extrapolate from our own phenomenal insides and correlate this with our nervous system's phylogenetic continuity with primitive organisms.

Earthworms, possessing the most constricted or narrow sentient, cognitive, and wakeful purview, have an equally narrow neural substrate subserving those integral functions constituting worms' specific "psyche." Because of this very narrow circumscription of its wakefulness, proportionate to its informing sentience and "cognition" (hardwired sensorimotor routines), such narrow wakefulness might subserve a full quota of phenomenal intensity. In other words, in spite of the elemental neuronal connectivities of an earthworm's ganglionic nervous system, topped by an unpretentious head ganglion, what little synaptic firepower there is to be mustered would be capable of sufficiently focusing its limited wakeful purview. This would make its experience comparable (proportionate) to ours insofar as its wakefulness would be that much more narrow, i.e., attentively focused upon, or diffused over, an equally wizened sensory input. Whatever little development its ganglia have undergone, whatever little sentience its ganglia can support, the worm's bodily trauma when bisected obviously cannot be questioned.

A demurrer is necessary in this context. No sensations could be felt by a frog on its body below the level of a sectioned spinal cord, yet still there arises a reflexive action of even the contralateral foot to wipe away noxious stimuli applied to those inaccessible lower bodily regions — and if humans experience no such sensations with parallel lesions, then frogs certainly do not either

(Huxley, 1874/1968, pp. 222–223). So seemingly adaptive pain behavior manifests but it is neurologically impossible to ascribe a phenomenal percept of pain insofar as such "pain" could not be felt within one's innards, being beyond the reach of the disconnected brain — hence such pain is not "real," i.e., could not be phenomenally experienced. The lesson I draw from this phenomenon, derived as it is from unusual experimental or pathological conditions, is not that behavior of infrahumans as it appears to us in daily observation is devoid of any "phenomenal viscera" but that behavior as such is not a necessary let alone sufficient condition for real pain ascription. Such behavior can manifest by means of muscular automatisms devoid of any central control, feedback, and sensorimotor awareness that is usually present and operative in the intact organism.

Wakefulness, of broad or narrow compass, is the generic precondition for discrete sensory and hedonic sensations punctuating that awareness. Accordingly, I am not merely denying that infrahumans are insensate. I am denying they have only some bare or dim sentience (whatever that might mean), instead supposing that their wakefulness and hence that their informing sensations with associated hedonic tones are fairly analogous to our own, even to a vivacious degree.

The concept of infrahumans' narrowed sentience, contrasted to folk psychology's presumptive dimming of such capacities, explains how an initial onset of noxious stimuli can be "just as" searingly intense as, and comparable to, our own. Of course, one prime qualification is necessary, insofar as worms can survive bisection through a regenerated moiety, while drawing-and-quartering of humans causes pain of a surpassing intensity and prolongation, if not inducing an immediate fatality. These behavioral, physiological, and anatomical differences reflect the far greater development of our nervous systems over invertebrates'. Yet a lacerated worm's phenomenal pain percept behaviorally appears fully as intense as that of a human's, if of much shorter duration. Another qualification involves the temporal onset and offset of worms' writhing. The offset may be fairly rapid after stimulation for planarians but presumptively their transient phenomenal pain would be "as" experientially jolting as ours, at least while it lasts — it certainly looks that way, undeniably so!

The emphatic qualification must be made regarding prolongation of pain as we experience with our developed central nervous system, contrasted to the worm's of fairly short duration. Pain duration is definitely abbreviated for certain invertebrates, with their simple nervous systems and concomitant tissue regeneration in which prolonged pain would serve no adaptive purpose. If nothing else, because their pains would be of such relatively short duration, as indicated behaviorally, in that sense theirs could not equal ours. But perhaps their pains' acute (albeit momentary) intensity might be in some sense "scaled proportionately" to ours? Presumptively a worm's felt pain is proportionate to the time required for its tissues to heal, fairly quickly for such a simple invertebrate, just as our pains tend to be precisely coeval with bodily injury. Their pain reception

must be more or less contemporaneous with the time necessary for wound healing, and this hypothesis coheres with the observational data. But nonetheless the onset of pain would be acutely sharp if transient; until and when its injury receded, it would be adaptive for the worm to experience pain.

This obvious point of contrast between the pain intensity involved in the worm squirm via bisection or impaling by fishing hook, and our own bodily trauma, may be seen via their equivalents: having one of our limbs lopped off or our being skewered with a sword. We would writhe in prolonged pain at such superlatively noxious stimuli, while the worm adjusts and recovers in a matter of moments after its immediate discomfiture. The illustration proves then there must be some kind of qualitative and quantitative diminution of worm pain relative to ours, a thesis coherent with folk psychology's. The worm squirm subsequent to bisection must be as traumatic an incident of pain induction as could be imagined for it, as with our own dismemberment. Yet even in that extreme instance, its behavior evinces an internal suffering of apparently quite short duration, with both halves recovering quickly and then parting amicably in the wake of both ends' mutually shared momentary sufferance — this even with the most excruciating damage done to its body short of inducing the animal's death. (Split-brain operations have led to much speculation in recent decades as to a possible duality of consciousness in humans, but the worm's bisected duality, including a newly generated head-ganglion for the hind quarters, seems to have escaped any analogous philosophical enquiry to date. Their nervous simplicity seems to have left them beneath contempt, "lower than a snake's belly in a wagon wheel rut.")

A posit of phenomenally intense pain for primitive organisms is warranted by the behavioral evidence though such pain's swift offset is also unquestionable. Thus any presumed invariant of phenomenal pain throughout the phylogenetic scale must be construed as a "phenomenal equality" of pain respecting only the dimension of acute intensity at most, not in terms of its chronic prolongation. Chronic pain is adaptive solely for higher organisms whose more complex cellular differentiation requires far longer periods of healing, recuperation, and regeneration of tissue and organ damage.

Yet an alternative explanation of the worm squirm seems somewhat plausible and more in line with the "dim consciousness" hypothesis. If we presume that wakeful luminosity dims down the phylogenetic chain, then a bisected worm may be interpreted as being only momentarily traumatized, as again the behavioral evidence certainly warrants. That is as traumatic as it gets for planarians, equivalent to our being tortured continuously. Does this constitute good evidence for their presumptive dimmed consciousness of pain, in some sense of dimness? For if it were as traumatic to them as for us, why such a quick offset of behavioral evidence for pain expression? (This is to leave aside Schopenhauer's contention that a dog's pain cannot compare with ours insofar as we add our neurotic providence,

hence anxieties, to our actual physical pains.) Perhaps then the acute pain from our stubbed toe is akin phenomenologically to a worm's bisection — we wince momentarily as it does when bisected, a presumptive equivalence appearing coherent with that behavioral evidence. This appears congruous also with the evidence that our nervous systems are far more developed, hence perhaps that phylogenetically earlier forms of pain registration within invertebrates represents a dimmer phenomenology. (Our "lower" pains equal their "highest" register of pain.) My reason for opposing this alternative is that it is not coherent with other equally apparent behavioral evidence, namely that of the waking and alert states of all sentient creatures and species. Again, if in a fit of anthropomorphism we were to misascribe our hypnagogic or semi-sleep (dimmed conscious) states to lower animals, such a posit conflicts with their complete mobility, sensory reactivity, and alerted responses acted out in real-time. A worm with its primitive sensory reception may stand no viable chance against a robin seeking to feed its offspring with the worm's body, yet nonetheless the miserable worm fights back concurrently with all its limited faculties by squirming and locomotion. There is, neurologically or behaviorally considered, no instance of groggy or sleep-walking animals in their normally awake states. They are wakeful and alert in their daily activities — this is why I suggest we must ascribe to them just as full a waking luminosity as ours. Dogs and cats are certainly more agile and animated than worms or lizards, thus we would not think of ascribing mere dim pains when they are undergoing vivisection. (This reticence of ascription may be because they are our favorite forms of pets and hence we are strongly emotionally attached to them.) Besides, when the question of waking or sleep states is brought up in the context of infrahumans, it is not a matter of the evidence favoring their being more somnolent than us — many species are more constantly aroused for longer durations than we are! In other words, they have at least as much right to be considered as wakefully aware as we ourselves.

Wakeful Invariance

A "proportionality constant" of wakefulness would obtain throughout phylogeny, according to this reasoning. This constant I describe as wakeful luminosity. Properly, degrees of intensity are ascribable only to discrete sensations or hedonic tones as with pain, heat, and loudness, whereas wakefulness as such is the apperception forum within which these discrete tones and sensations manifest. (Nonetheless we may describe degrees of the constant itself, as with sleepiness versus alertness.) There are two primary categories composing the psyche (besides the ego), namely wakefulness and its informing faculties as sentience, cognition, and the emotions. There are at least four dimensions of the sentient faculties: (a) their number (e.g., the few sensory modes of a worm versus our many); (b) the resolution or discrimination afforded to individual sense modes (e.g., the

worm's heliotropism versus mammalian foveated vision, a dimension involving dimness proper); (c) the intensity of sensations and hedonic tones; and (d) the duration or relative prolongation of sensations and tones as aversive pain.

Regarding the phenomenon of wakefulness itself, indeed it can become dim as exemplified when we fall asleep. We may posit a threefold division within wakefulness itself. There is suspended wakefulness as in sleep or coma; dim wakefulness as in twilight states between sleeping and waking, sometimes affording hypnagogic phenomenology; and the full luminosity of normal wakeful awareness, more or less uninterrupted and unflagging throughout the day.

By hypothesis, throughout phylogeny the luminosity of the waking state is constant for all species and animate beings, even Precambrian precursors of modern planarians. With the term "luminosity of wakefulness," its meaning can be given only ostensively, suggesting a positive state of alertness; a responsiveness to stimuli, goading, and interrogation; a negative characterization of not being asleep; and being perceptually aware of one's environs or introspections. Reason is *implicate* with our consciousness but not *causative* of it. Further, wakefulness itself is neither implicate with, nor causative of, the mental luminosity here described ostensively. Rather, wakefulness is *numerically identical with* this luminosity. (The term *luminosity* is doubly appropriate to the phenomenon in question, for literal and figurative darkness ensue from dimmed lights and a sun over the horizon, concurrent with closed eyelids leading to sleeping unconsciousness. Complementarily, waking in the morning leads to literal and figurative luminosity, our opened eyes seeing morning light almost exactly concurrent with reappearing consciousness.)

If we assume contrarily the wakefulness of (say) the worm is dim, then this incapacity must be added to their known primitive perceptions (as with indiscriminating heliotropisms). This combination would result in anything but an actually ambulatory and alert animal, as it would be virtually comatose and insentient ("unawake") in face of its few and dim sense modes generating percepts of dim intensity and short duration, within the context of an assumed "dim wakefulness" that would compound the maladaptivity of its delimited sensorium. In reality, every creature's wakeful luminosity inherently enables as immediate, as global, and as "transparent" (undimmed) an *access* to its sensations and hedonic tones as we have to ours.

Yet this proposition of a wakeful luminosity as a constant throughout phylogeny definitely runs up against the implication of an established principle. Just as we cannot reasonably allocate our experiential sensory phenomenology to infrahumans (or at least not to inframammalians) insofar as the neural substrate is not there to subserve such sensory processing, so any supposed constant wakeful luminosity would presumptively require a neural arousal system equal in complexity to ours, which in fact is not found in (say) primitive ganglia. Perhaps with fewer sense modes, the neural substrate of lower organisms' arousal

systems would be proportionate to their more restricted sentience and sensorimotor control. In this way, because their arousal systems are neurally scaled to their sensory networks, these animals could have a wakeful luminosity that might be, experientially speaking, proportionate to our own first-person perspective.

Why would anyone even wish to maintain such an otherwise eccentric position positing a phylogenetically constant wakefulness, involving as it does so many complications as I have adduced? The primary motive is to explain, rather than explain away — in other words, to save the appearances of — the behavioral evidence. Even the dim nociceptive awareness of planarians exhibits an extreme, albeit transient, intensity of pain upon bisection. This is to reference only worms — but what of mammals such as chimps and dogs who obviously endure prolonged and intensive pain when injured (pain at least as prolonged as ours), indeed, that even show psychological disturbance when isolated, mistreated, or rejected. The evidence throughout the whole of phylogeny shows gradations of perceptual sensitivity in the behavioral and neural contexts of wakeful altertness. This evidence seems to mandate a supposition of constant wakeful luminosity *within which* the continuous dimensions of sensory percepts and hedonic tones manifest, rather than this cumulative evidence being construed one-dimensionally as mere "unconscious" and "instinctive" behavioral reactions.

Do cows and sharks sleep? Not quite in the same way that humans do (Koella, 1967); their sleep is of shorter duration and depth. If in phylogeny one species attained to "greater" (more extensive or intensive) consciousness than another, we would suppose that the crown of phylogeny, Homo sapiens, would have the most developed nerve nets and brain structures subserving waking and arousal, but in fact cows and sharks among other animals have a more constant arousal mechanism than we do. This seems to suggest that phylogeny does not advance to greater consciousness by generating more arousal as such. Otherwise, bovine species would have overtaken our own reasonable consciousness long ago, hence that we would be tilling the soil for them instead of they for us. Waking arousal is by hypothesis here a *sine qua non* of our consciousness but not its essence (a necessary but not sufficient condition); superlative cognition *inter alia* is also required for our proprietary brand of informed wakefulness. (That there is little or no discernible sleeping among certain species does not render unsound the reasoning advanced above, namely that the concept of unconsciousness has meaning only relative to its normative contrast of waking consciousness. It means simply that — some animals spend a proportionately shorter time sleeping than we in the diurnal cycle.)

Conclusion: Consciousness Analyzed

Folk psychology lands itself in paradox when observing that infrahumans obviously have pains, hence are "conscious" (wakefully aware), while yet deducing

concurrently they cannot be conscious in the sense that they do not have reason. I wish to vindicate common sense on both these scores to resolve the paradox. Yes, animals are "aware" insofar as they are wakefully sentient, but no, they are not "conscious" in that they have not reason proper. Recall that this statement hinges partly on semantics, as the relevant terms are tentatively defined in this essay, for to be "conscious proper" means to have *both* wakefulness and reason. Again, to be "not conscious" is not necessarily to be unconscious. For animals to have wakefulness, sentience (with which sensorimotor coordination is inherently bound up through maturation), nociception, and multifarious appetition must be to experience much of what adult humans do. Wakeful luminosity in particular is by hypothesis the essence of our consciousness.

One might go so far as to try to "bracket" our reason in an attempt to get a phenomenal approximation of the experience of (say) higher mammalian taxa. Thus, perhaps a reverie in which wakefulness is perfused with "pure sensation" (as the pre-Gestalt psychologists attempted to access in their psychophysical experimentation), ostensibly devoid of infiltration by rational categories, might afford us a hint of "pure" animal wakefulness emptied of providential clairvoyance. I suggest such an attempt would be rather futile insofar as each species-characteristic psyche would have its own experiential integrity. In particular, our reason always tacitly perfuses even our dreaming consciousness, let alone our waking states, whether we attempt to ignore its omnipresence or not. All is not lost, though, for inter-species communication is as obvious and mundane a phenomenon as our pets intuiting our moods or we theirs. Emotive and cognitive understanding permits us to understand others, human and infrahuman, even if perfect empathy is impossible —which notoriously obtains even between males and females of our own species.

A naturalistic epistemology, implicate with a theory of consciousness showing how wakefulness unfolded in phylogeny, plus hypotheses to tease out the structure of various conative, perceptual, and cognitive strands making up our perception and apperception, might allow us to extrapolate to animals' various forms of awareness. Thus conceptually oriented, we might be able to observe or hypothesize attenuations (diminutions) or a narrowing of cognition, sentience, and emotion, thereby more efficiently conjecturing how they might have been crafted through evolution.

How do conscious awareness, sentience, cognition, and emotion fit together in a coherent conceptual scheme? Has cognitive science clarified these matters sufficiently for general consensus? If we look at such questions in an empirical manner, we have vast material at hand from ethology, the neurosciences, biological taxonomy, and phylogeny. I suggest this is the proper domain within which to investigate the nature(s) of consciousness, at least as we might construe mind naturalistically in evolutionary perspective. I believe that if we are to find out how wakefulness and sentience, conation and cognition have unfolded in

the biosphere, such a multidisciplinary domain would be the more fit place to start rather than with the physics of the brain, modal logic, or with debating physicalist monism versus Cartesian dualism (e.g., Armstrong, 1968; Chalmers, 1996; P.M. Churchland, 1989; P.S. Churchland, 1986; Dennett, 1969, 1991; Penrose, 1991).

Starting with elementary concepts from cognitive psychology as those of sentience, wakefulness, cognition, emotion, motivation, consciousness, "awareness," and attention we determine which concepts are viable respecting the empirical data and which might best represent natural kinds, thence articulating these concepts into a coherent system that can be refined indefinitely further by reference to the anatomical, neurological, evolutionary, and biological data. In this way, the total functioning organism can be specified in terms of its broadest conation, i.e., its wakeful intelligence as informed by motivation, experience, emotion, and its immediate sensory surround, all such drives and capacities focused by an attention that directs a sequential unfolding of activity ultimately organized by innate, learned, or creative behaviorial schema.

When I read extant philosophy, neuroscience, and cognitive psychology texts I see no reference whatever to such a simple interpretive scheme, though it is but an interpretation devolved from folk psychology, refined and spruced up with biological citations *passim*. If it were as well-known as its obviousness would suggest, it is curious I find not even a glancing citation in the available texts (though this might be an argument from silence on my part). It seems to me the biological evidence comes alive with the default folk hypothesis, as wakefulness informed by an expanding sentience and cognition can be naturalistically interpreted to explain the evolution of consciousness.

References

Armstrong, D.M. (1968). *A materialist theory of the mind*. New York: Routledge.

Barnett, S.A. (1967). *Instinct and intelligence*. Englewood Cliffs, New Jersey: Prentice-Hall.

Bickle, J. (2003). *Philosophy and neuroscience: A ruthlessly reductive account*. Norwell, Massachusetts: Kluwer Academic Press.

Calvin, W. (1990). *The cerebral symphony*. New York: Bantam.

Chalmers, D. (1996). *The conscious mind*. New York: Oxford University Press.

Churchland, P.M. (1989). *A neurocomputational perspective*. Cambridge, Massachusetts: The MIT Press.

Churchland, P.S. (1986). *Neurophilosophy*. Cambridge, Massachusetts: The MIT Press.

Churchland, P.S., and Sejnowski, T. (1992). *The computational brain*. Cambridge, Massachusetts: The MIT Press.

Crooks, M. (2003). Phenomenology in absentia: Dennett's philosophy of mind. *Journal of Theoretical and Philosophical Psychology, 23*, 102–148.

Crooks, M. (2004). The last philosophical behaviorist. *Journal of Theoretical and Philosophical Psychology, 24*, 50–121.

Crooks, M. (2008). The Churchlands' war on qualia. In E. Wright (Ed.), *The case for qualia* (pp. 203–221). Cambridge, Massachusetts: The MIT Press.

Crooks, M. (2011). *Semantikos*: Understanding and cognitive meaning. Part 1: Two epistemologies. *Journal of Mind and Behavior, 32*, 91–112.

Dennett, D. (1969). *Content and consciousness*. New York: Humanities Press.
Dennett, D. (1978). *Brainstorms*. Cambridge, Massachusetts: The MIT Press.
Dennett, D. (1991). *Consciousness explained*. Boston: Little, Brown.
Dennett, D. (1995). *Darwin's dangerous idea*. New York: Simon and Schuster.
Descartes, R. (1955). The discourse on method. In E.S. Haldane and G.R.T. Ross [Trans.], *The philosophical works of Descartes* (pp. 79–130). New York: Dover. (Originally published 1637)
Hebb, D.O. (1949). *The organization of behavior*. New York: Wiley.
Huxley, T.H. (1968). On the hypothesis that animals are automata, and its history. In *T.H. Huxley: Collected essays* (pp. 199–250). New York: Greenwood Press. (Originally published 1874)
Jaynes, J. (1990). *The origin of consciousness in the breakdown of the bicameral mind*. Boston: Houghton Mifflin.
Jung, C.G. (1961). *Memories, dreams, reflections* [A. Jaffe, Ed.]. New York: Pantheon.
Jung, C.G. (1971). *Psychological types* [R.F.C. Hull, Trans.]. Princeton: Princeton University Press. (Originally published 1921)
Koella, W.P. (1967). *Sleep, its nature and physiological organization*. Springfield, Illinois: Thomas Nelson.
Koestler, A. (1968). *The ghost in the machine*. New York: Macmillan.
La Mettrie, J.O. (1912). *Man a machine*. Chicago: Open Court. (Originally published 1748)
Meddis, R. (1977). *The sleep instinct*. Boston: Routledge & Kegan Paul.
Penrose, R. (1991). *The emperor's new mind*. New York: Oxford University Press.
Ryle, G. (1949). *The concept of mind*. New York: Barnes and Noble.
Sagan, C. (1977). *The dragons of Eden*. New York: Random House.
Schopenhauer, A. (1969). *The world as will and representation* [E.F.J. Payne, Trans.]. New York: Dover. (Originally published 1844)
Singer, P. (1975). *Animal liberation*. New York: Avon.
Skinner, B.F. (1974). *About behaviorism*. New York: Alfred A. Knopf.
Smythies, J. R. (2003). Commentary on Crooks. *Journal of Theoretical and Philosophical Psychology, 23*, 149–156.
Stebbins, G.L. (1982). *Darwin to DNA, molecules to humanity*. San Francisco: W.H. Freeman.
Thompson. R. (1985). *The brain*. New York: W.H. Freeman.
Wittgenstein, L. (1951). *Philosophical investigations*. New York: Macmillan.
Wooldridge, D.E. (1968). *Mechanical man: The physical basis of intelligent life*. New York: McGraw-Hill.