

Big Brains and the Human Superorganism: Why Special Brains Appear in Hominids and Other Social Animals

Niccolo Leo Caldararo

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Caldararo presents an evolutionary view of humans as a superorganism similar to that found in highly social species such as ants, bees, or termites. His evolutionary approach is strongly based on analogical reasoning, not only in cases of parallel degrees of complexity with other social species but also with respect to the relation of brains to social complexity. He divides his argument in two parts: Part I, “Brains and Performance,” in which he covers competing theories of brain evolution and the nature and function of the human brain in relation to social complexity; and, Part II, “History of a Genus and the Evolution of Society,” in which he analyzes several pertinent anthropological problems of the human species relating to the human superorganism, e.g., racism, disease, education, and homelessness.

It must be admitted that Caldararo does not provide much in the way motivating the problem of interpreting the human species as a superorganism, and the style and pace of the book reads like a bibliographical essay from the outset. His review of the cited literature is terse and spans not only biology, anthropology, and psychology, but also history and philosophy among other subjects. So, a fair amount of background knowledge—some general, some specific—is helpful, if not necessary, to make sense of his discussions and critiques. While it may not have been essential, it certainly would have been helpful if Caldararo had provided more motivation for, or detailed reconstruction of, key arguments that are especially germane to his goal of defining the human superorganism. There are some notable exceptions, however: e.g., his critical interest in the nature-versus-nurture debate compelled him to spend more time analyzing the theories of such relevant authors as E. O. Wilson (sociobiology) and Steven Pinker (nativist theory of mind).

Not far into the book, it becomes apparent that reconstructing Caldararo’s overarching argument presents a challenge—key assumptions and principal conclusions are not clearly specified, and it is often difficult to tell where he agrees or disagrees with the numerous views that he synthesizes. His own ideas and arguments are thus largely left to the reader to discern. This effort includes grasping the *sine qua non* of his preferred formulation of the human superorganism, which is not initially defined but only hinted at early on by Kroeber’s culture concept of the superorganic (page 9). As far as an operational definition of superorganism is vital for a comparison of parallel evolution across certain species, Caldararo’s argument requires more than an additive theory of culture and behavior. Con-

necting the nature of big brains to social species is nevertheless the goal of Part I of his book. To this end, he analyzes increasing complexity in the brains of several species along scales of social organization that range from individual function to collective purpose, or from the organism to the superorganism. Incidentally, it is with respect to the question of complex social animals that he first provides an illuminating discussion of the problem of defining ‘superorganism’ (pages 45–46). The properties of sociality that he finds most useful for cross-species comparison amount to a special case of complex sociality, namely, eusociality. He thus adopts a definition of the term, commonly employed in the sociobiological study of insects, that includes food sharing, caching, coordinated group behavior, and periodic collapse of social complexity (page 47). He then appears to suppose that eusociality is a necessary condition for a species to be identified as a superorganism, assuming the two are not already equivalent concepts (page 45). Ideally, a complete evolutionary account of human eusociality, and hence of the human superorganism, would reconstruct the evolutionary history of the species that include key adaptations which underlie increasing social complexity, such as big brains. Caldararo does highlight the importance of this requirement, but he nonetheless does so while pushing the analogy between human sociality and eusocial insects (e.g., pages 44, 68–69).

At this stage it may strike the reader as curious that Caldararo does not make more of primatological observations or comparisons, as his remarks on primates are few and inconsequential. A comparison of life history traits among primates, for instance, might shed more light on the evolutionary relation of human brains to the human superorganism than would entomological theory or facts. He is, however, quite interested in different species of *Homo* and what their evolutionary trajectories might entail. For example, the trend of increasing brain size and complexity in *Homo* through the Pleistocene, especially by 500 kya, presents mixed results for Caldararo. On the one hand, his assumption of inherited connectivity and convolution in human brains, which underlies language, culture, and innovation, is a “remarkable evolutionary achievement” (page 62). On the other hand, when it comes to a species’ intervention in the environment, human manufacture of tools “is no more significant than bird’s nest construction” (page 70). So, the human brain and cognition is special in some ways but not in others. This result of Caldararo’s analysis may indicate the limits of analogical reasoning about paral-

lel evolution as well as the problems that arise when that method is pushed to achieve an otherwise untenable or incomplete explanation. Indeed, further tension at such explanatory limits appears in his remarks on the correlation of *Homo* brain size and social group size. On the one hand, *H. rudolfensis* appears to mark the moment in the evolutionary history of the genus that the two metrics become positively correlated and perhaps indexical of increasing social complexity (page 74). On the other hand, large brain size in certain species of fish do not correlate to any notable social complexity (page 75). Certainly, the latter observation has little, if any, significance in an explanation of *Homo* brain evolution and social complexity. Caldararo nevertheless identifies an important evolutionary result in the history of the genus that we might carefully ponder—human brain size plateaus in the Upper Paleolithic, just before the emergence of Neolithic sedentism and increasing population densities. Not until the Neolithic, he further observes, do human societies start to exhibit eusocial traits, and then, perhaps, instances of the human superorganism (page 99).

In the second part of his book, “History of a Genus and the Evolution of Society,” Caldararo now takes for granted the human superorganism concept and turns his attention to what may be described as relevant problems in applied anthropology. The working evolutionary idea of the remaining chapters concerns aspects of society and culture that exercise selective pressures on human cognition. His chapters on the societal problems of racism and homelessness illustrate these pressures and include critical and interesting discussions on such topics as colonialism, urban environments, debunked racist theories of human brains, and various implications for the human brain and superorganism. Caldararo also provides an interesting historical account of the anthropological theory of the late nineteenth century Haitian author Antenor Firmin, who dismantled supremacist theories of the colonial period decades before Boasians appeared on the anthropological scene. Moreover, he considers at length the problem of mass prescription of drugs to adolescents to treat ADD/ADHD and supposes that mass consumption of prescriptions among the American population is a harm to the human superorganism (page 161). That said, the second part of the book does not really amount to what the title entails, namely, the said history *per se* or said evolution *per se*. Rather, it is mostly about modern or contemporary issues in society that implicate the human brain and the present or future well-being of the human superorganism.

Given the conceptual and interdisciplinary breadth of Caldararo’s project, interested specialists may evaluate parts of his argument in their respective disciplinary capacities. For instance, Caldararo’s last chapter, “On the Curious Illusion of Human Uniqueness,” may pique the

critical interest of the philosopher or biologist concerned with organisms as kinds of being. His emphasis on increasing social complexity over time suggests that the human species—or any other social species for that matter—has evolved a unique combination of properties that make it different in kind from other organisms. Indeed, the possible evolution of the human species as a superorganism could constitute an instance of emergence, by which the species becomes different in kind from its immediate ancestor, not to mention all other species. However, Caldararo argues to the contrary, claiming that, regardless of technological advances and possible extraterrestrial colonization, humans will be “doing nothing different in kind than what yeast does: reproduce and colonize” (page 196). Identifying a property that virtually all life on earth has in common does not negate the existence of various kinds of biological beings. There most certainly are unique properties of some species that are not found in others, e.g., human language (an evolved natural kind of communication), and these emergent properties may suffice to define a genuine difference in kind. But not even human language escapes Caldararo’s reductionism, as he agrees with views of language as nothing more than an advanced degree of signaling or means to organization (pages 22–23). It is a logical fact of biological discourse that we talk about different kinds, not different degrees, of species and organisms. In other words, while there may be degrees of speciation (a process measured by molecular clocks), there are no degrees of species. Hence there is no illusion here whatsoever, logically, biologically, or ontologically speaking. Caldararo is simply imputing too much metaphysical weight to the idea of natural kinds. Incidentally, such criticism might be better directed at the alleged existence of *the* human superorganism, which Caldararo consistently employs with the definite article. Moreover, his conclusion appears to collapse the distinction between kinds of being and kinds of doing. A more apt question may therefore be to ask how a species (a natural kind of organism, that is) goes about reproducing and colonizing. An adequate answer to that question would entail a non-reductionist account of the unique properties or adaptations of the species that makes those fundamental biological pursuits possible in the first place.

In sum, Caldararo’s book may serve as a helpful introduction to the general topic of superorganisms and the question of a human superorganism. The text is full of citations linked to a variety of related issues or implications, so readers can pursue the cited literature according to their individual interests. The interdisciplinary reach of this relatively short work is impressive, however ambitious, and may inspire further interdisciplinary approaches to the evolutionary role of human brains—past, present or future—in culture, society, and the species at large.