Book Review


Who, exactly, is the thinking ape? Byrne's pun, of course, is that from an evolutionary perspective humans are apes. Thus, the title of his book about the evolution of primate intelligence is intended to remind us that although humans appear to be the most cognitively specialized species around, we ought to be able to find the origins of this specialization in our closest living kin—the great apes. Although the book itself appears to be laid out as an undergraduate text, or a companion reader for a graduate seminar on primate cognition, it is most certainly not a dispassionate overview of theory and research. Quite to the contrary, Byrne argues emphatically that although humans have elaborated and specialized in "thinking" (as it were), the real qualitative differences in intelligence separate the great apes—chimpanzees, bonobos, gorillas, and orangutans—and humans, on the one hand, from most other primates, on the other.

In Part 1 of the book, Byrne briefly explores the logic and method of evolutionary reconstructions (in particular, the cladistic method of reconstructing the likely features of the hypothesized last common ancestor of living species). First, he provides a useful overview of current views on primate taxonomy. Second, he explains how a cladistic analysis of the traits of living species can be used to infer what traits were likely present in their last common ancestor. In so doing, Byrne sets the stage for what he really wishes to do, apply this same cladistic logic to cognitive traits. But the real work of the book begins in Chapter 3, where Byrne attempts to locate a usable definition of the term intelligence. After all, a book subtitled Evolutionary Origins of Intelligence certainly must offer some parameters for what, exactly, is meant by intelligence. Byrne recognizes the difficulty of the task. Operational definitions of intelligence are fine, but they are clearly not sufficient, precisely because Byrne wants to isolate a more unified ability that natural selection acted upon during the unfolding of primate evolution. Conversely, intelligence might simply be viewed as those adapt-
tations that bridge the gap between the environmental challenges faced by organisms and the animal's behavioral responses to such problems. But here Byrne holds out for a distinction between behavioral repertoires that look intelligent, but in reality only "resemble the products of intelligence" (p. 35). As he puts it, "Actions that are specified in advance by genes are a different matter from the superficially similar ones we call intelligence in people..." (p. 35). Byrne notes several pages later that a dichotomy between innate and learned behaviors is problematic, but only as an introduction to a different dichotomy, that of the rigid products of learning versus the flexible products of intelligence.

In the end, Byrne offers three ideas that might help to delimit the scope of what we mean by intelligence. In order to qualify as intelligent an animal must be able (1) to "gain knowledge from interactions with the environment and other individuals," (2) to "use its knowledge to organize effective behavior, in familiar and novel contexts," and (3) to "deal with problems, using...any ability to put together separate pieces of knowledge to create novel action" (pp. 39-40). This, then, is the somewhat unsatisfying yardstick against which Byrne attempts to understand which are "intelligent species" (p. 41), which are not, and furthermore, why such intelligence evolved in the first place.

Part 2 of the book reviews some recent changes in ideas about learning and imitation. Byrne argues that the traditional view of animal learning envisions animal intelligence as synonymous with classical conditioning, instrumental conditioning (trial-and-error learning), and in some cases imitation (loosely defined). What animals lack most critically in this view is insight. Byrne proceeds to overview some of what is known about the constraints on learning—"genetic channeling of learning." Next, Byrne devotes two chapters to reviewing some of what is known about imitation in animals and reviews current distinctions about the important difference between stimulus enhancement, response facilitation, emulation learning, and true imitation, which he characterizes as the ability to "build up new behaviors (or new sequences of old behaviors) by observation alone..." (pp. 61-62). After reviewing the patchy empirical evidence, Byrne concludes that although the great apes may show evidence of program-level imitation, only humans display imitation of task organization and goal structure along with fine-scaled copying of the details of the actions.

Parts 3 and 4 of the book comprise the real substance of the book. It is here that Byrne marshals evidence that apes are a step apart from monkeys, and indeed other mammals in general. By comparing phyletic differences in tool-using, tool-making, understanding causality, mental state attribution, self-recognition in mirrors, teaching, and social manipulation and deception, planning, and language, Byrne offers the conclusion that
the great apes are qualitatively different from monkeys in a domain general aspect of cognition—insight and an ability to concatenate disparate facts in order to generate novel solutions to novel problems. Finally, Byrne examines the social versus ecological explanations of the origins of primate intelligence. He concludes that although there is a reasonable body of data to suggest that aspects of the primate brain (neocortical size) may be correlated with social complexity (as approximated by group size), and not with more ecological factors such as range size or diet, he argues that this broad correlation across all primates is merely a backdrop against which a "sharp discontinuity" in mental functioning is superimposed: "This intellectual watershed lies between monkeys and apes. The great apes, especially chimpanzees, give abundant evidence of a greater depth of intelligence than possessed by any monkey: the quality that we call 'insight' in humans" (p. 224).

In a sense, Byrne's commitment to a sharp discontinuity between monkeys and apes—a proposal first made by Gordon Gallup many years ago—merely serves to highlight a continued failure to achieve a clear insight into the evolutionary causes of the evolution of these hypothesized differences. For example, if the Machiavellian intelligence hypothesis is correct, why did chimpanzees purportedly evolve abilities related to mental state attribution, while other highly social primates with equally large (or even larger) group sizes did not? Or if more general ecological contexts selected for insight abilities that were then applied in other contexts, which seems to be where Byrne is headed in the final chapter, Why did this "quantum leap" (p. 232) occur in the ancestors of the great apes, but not earlier? Byrne notes that chimpanzees use and fashion tools in ways suggesting that they anticipate and plan, but to us the relatively small importance that tool use (no matter how sophisticated relative to monkeys) plays in the day-to-day lives of the great apes suggests that tool-use and tool-making were a consequence rather than a cause of some cognitive skills. One possibility not seriously considered by Byrne is that the recent data from our laboratory (as well as Michael Tomasello's) which suggest that great apes do not really possess abilities related to mental state attribution of the type he describes in Chapter 8, and hence are not really so different from monkeys, may be fairly accurate. Of course, these findings leave open the possibility that the great apes do stand out in terms of understanding the self as a causal agent. This ability may have been selected for as a psychological mechanism for assisting extremely large-bodied, arboreal apes to deploy highly un stereotyped locomotor behaviors in the context of negotiating the task of crossing gaps between trees—a problem created by the evolution of so large a body size alongside a commitment to arboreality. This would explain why the great apes (with caveats con-
cerning gorillas) continue to look so different on tasks of simple self-understanding (mirror self-recognition) but not social understanding (theory of mind).

This book appears to be intended for students outside the field of primate cognition as an introduction to the area. The depth of coverage of the particular topics is not extensive, in several places omissions in scholarship occur, and in a number of places the content is already out-of-date. However, it does not appear that it was Byrne’s intent to produce an exhaustive or scholarly review. Rather, the book offers an easily readable, focused overview of one line of thinking about the evolution of primate intelligence. Some will find his interpretation of ape teaching, theory of mind, and language use generous; others will find his claim that monkeys lack insight learning dubious. Still others will be frustrated at his insistence on using the terms intelligent in so loose a manner, e.g., “Why did some animals become intelligent?” (p. 177). All, however, will find a passionately presented argument in favor of one particular slant on a field of rapidly growing importance.

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