

Teaching an old dog new tricks

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Adaptationists are often charged with vastly overestimating the effect of natural selection in evolution: Selection does happen, say the critics, but other factors are as important, or more important: genetic drift, developmental constraints, the sheer historical paucity of alternatives from which selection might choose, and so forth. From Schull's perspective, these critics are asserting that species are idiots – capable of only trivial guidance with carrot and stick, minimally educable within strict limits, but otherwise quite hapless wanderers within structures whose shapes owe little to the shapes of their wandering. A more reasonable view would take a hint from psychology and recognize that the different constraints on learning vary with time and circumstance; some things are easy to learn at one stage of life, and very hard or impossible to learn at other stages. Under some circumstances species are all but uneducable, and at others they are ideally poised to dash ahead through the problem-space of alternatives.

Applied to Schull's claims, this suggests that it would be a mistake to try to argue for, or against, any universal claim. It is not that all species are always intelligent, or that none ever are, but just that sometimes species do move through design-space much faster than one would expect (on the assumption of purely blind trial and error), and when they do, it is because they exhibit organizations that have the same structure as the organizations that seem to account for intelligence and learning in organisms. Also, although Schull ignores this point, sometimes species *fail* to move through design-space as fast as one would first expect – they get stuck on the threshold of an advance as if they were too stupid even to benefit from blind trial and error.

Schull asks a series of excellent pointed questions at the close of his piece, and the last is addressed to me: "When Dennett (1983) argues for the appropriateness of intentional descriptions of evolutionary processes, does he realize that the ascription of intentionality in evolution may be convenient for precisely the same reason that it is convenient in psychology?"

Yes and no. I didn't then see that evolution might speed its way through search-space by the processes Schull describes so well here, but I did see that even without such speed-up, the inexorable "discovery" of design solutions by the process of natural selection can benefit from an intentional characterization for the same reasons psychological phenomena benefit from them: They reveal an order that is there, however slowly and inefficiently it is eked out. In Dennett (1987), I wrote that the illusion of intelligence [of natural selection] is created because of our limited perspective in the process; evolution may well have tried all the 'stupid moves' in addition to the 'smart moves,' but all we see is the unbroken string of triumphs" (p. 317). Schull shows that there are conditions under which evolution does not

have to try all the stupid moves *itself*; it can benefit from the filtering experience of swifter surrogates: for example, the phenotypic plasticity of organisms in the Baldwin effect. I welcome Schull's analysis of this bonus, but still insist that the effects he cites are in no way a *prerequisite* for the appropriateness of the intentional stance in evolutionary theory.

Schull expresses the hunch that "blind watchmakers may just have to be very, very smart," and goes on to note that these are "investigable issues." I agree. That is, we have known for a long time that the characteristic process of natural selection is capable of undergoing multiple recursions, and it is always an empirical question which level of the process is responsible for any particular bit of design. For instance, does the organism have to learn to walk, or is that capacity something "learned" by its ancestors and innate in the organism? It could be either (some organisms are born with a mature locomotor capacity; others aren't), and only an empirical investigation will settle the question. Schull proposes a new set of such questions: Did a particular product of genetic evolution arise by the slow, basic process of blind trial and error, or did it get accelerated by various aspects of "species intelligence"? It might be, though this would be hard to prove, that there hasn't been enough time to explain the arrival on the scene of some particular complexity *unless* it were the product of a "smart" blind watchmaker. I do not think, however, that any other empirical test could demonstrate the necessity of past species intelligence. This is related to the claim I make in Dennett (1987) that no "Martian" biologists, examining greyhounds and laying hens, cheetahs and barn swallows, could prove, simply from an examination of the organisms, that the former were the product of deliberate, foresightful artificial selection, and the latter were entirely the product of "natural" selection. No design could be so complicated or wonderful that one could argue that it was inaccessible to "stupid" natural selection but accessible to "intelligent species" natural selection, unless the argument was based on nothing but the shortage of "R and D" time.