The Human Nature Review
ISSN 1476-1084
URL of this document
http://human-nature.com/nibbs/03/cooper.html

Human Nature Review **3** (2003) 303-305

Book Review

Why The Laws of Thought Are, After All, the Laws of (Evolutionary) Logic

By William D. Casebeer

A review of *The Evolution of Reason: Logic as a Branch of Biology* by William S. Cooper. Cambridge University Press, 2001.

Driven by an understandable desire for consilience, and a willingness to rethink received views in light of new discoveries, a cottage industry has grown up around showing how a neo-Darwinian worldview can shed light on the origin and justification of such things as morality, rationality, and knowledge. William Cooper's *The Evolution of Reason: Logic as a Branch of Biology* is a fascinating contribution to evolutionary epistemology, and as such, it focuses primarily on the last two fields, with the emphasis on reasoning classically construed…as computation across representations, where the computational structure takes canonically rational form. Some critics will think Cooper and his naturalistic brethren are dramatically misguided: evolution has nothing to do with norms, be they moral, logical, or epistemic. Don't mix your facts with my norms, they would say (and yes, the allusion to the old commercials about the origin of Reese's peanut butter cups is intentional, with the structural relations of the metaphor to be preserved across the mapping). For his part, Cooper steers clear of the big-picture debate about the relationship between the empirical and the normative, preferring to let the explanatory power of his approach speak for itself.

This decision should tell you who will be most satisfied with Cooper's book, and who will be most annoyed by it. Those looking for a comprehensive conceptual examination of the intertwining of the normative and the empirical, with a robust *a priori* defense of the reducibility of the former to the latter, will be disappointed; those wishing for a more empirically informed defense of the reducibility thesis, who are willing to entertain subversive co-minglings of logical norms and biological concepts, and who aren't so much concerned with traditional conceptual distinctions, will be intrigued by Cooper's argument.

Cooper defends a "reducibility thesis": logic *is reducible to evolutionary theory*. That is, logical rules are directly derivable from evolutionary principles. As Cooper states, "accord-

ing to the reductionist claim, logic is so biological that if the classical laws of logic had not already been worked out independently, an evolutionist innocent of any prior knowledge of formal logic could in principle have stumbled upon them simply by drawing out the consequences of standard evolutionary models and processes" (p. 12). Cooper supports the reducibility thesis by ascending a "ladder of reducibility": he devotes a chapter each to showing how evolutionary theory implies life-history strategy theory; life-history strategy theory then implies decision theory; decision theory implies inductive logic; inductive logic implies deductive logic; and this in turn implies mathematics. Each of these things (descending the ladder now…) reduces back to the next (math to deductive logic *a la* the logicist paradigm, and so on) until you are back to life-history theory. This is a lot to do in 226 pages, so Cooper's arguments and examples are sometimes impressionistic, as he freely admits.

In order to accomplish the derivation of decision theory from life-history strategy theory, Cooper identifies subjective expected utility (SEU) with subjective fitness. This is problematic, he notes, as the founders of utility theory usually identify utility with pleasure (although contemporary decision theorists often proffer some version of desire satisfaction instead). Cooper argues that the structural fit between SEU and fitness is too good to pass up the identification of the two. Whether or not one finds Cooper's argument persuasive will affect what one makes of the overall project…so it goes for basically every step up (or down) the ladder. The journey is an exhilarating one; Cooper's book is filled with provocative suggestions, interesting asides, and creative identifications of functions and entities that are more familiar to logicians with purely biological processes and objects. A skeptic could put her foot on the brake at any of these junctures, but the ride is far too much fun to allow squeamishness to keep Cooper's foot off the accelerator.

I am friendly to many of the suggestions Cooper makes as he climbs the ladder. Nonetheless, the most troubling aspect of the book is that it is too quick to hitch norms of all kinds directly to fitness, with not as much consideration given to the role that intermediate entities (such as *biological functions*) might play in defining normativity within a domain. For instance, while it is true that there must be law-like connections between the successful operation of my visual system and reproductive success (else my visual system would not have evolved!), it would be too quick to argue that, therefore, the function of my visual system is to enable reproduction. That explanation is vacuous, although true in a distal sense of the use of the term function. Explanatory insight would be added by noting that it is my visual system's capacity to transform certain kinds of energy into other kinds of energy—to enable me to *see* by transducing photons into neurochemical patterns—that has allowed it to play its fitness-enhancing role, and, moreover, that the only reason my visual system possesses this capacity is because of history-laden selection pressures. Cooper's book would have benefited from a more detailed discussion regarding why we should choose to identify logical normativity with only its distal function rather than its "modern history proper function" (whatever that might be in the case of cognition; I'm partial to Peter Godfrey-Smith's view that the mind is a device for dealing with environmental complexity). This discussion would not deflate any of Cooper's explanatory ambitions—indeed, it would complement them—but it might prevent critics from too hastily latching on to some of the rhetoric so as to discard the book's thesis wholesale.

In sum, Cooper offers a plausible case for the reduction of logical norms to biological evolutionary laws. Naturalistically inclined philosophers will find it an enjoyable ride. Evolutionary epistemologists of every stripe could benefit from a close reading of it. Critics may not be persuaded, but we should not let their demands for *a priori* discussion of the

conceptual distinctions between facts and norms put a stop to what may prove to be an extremely fruitful line of inquiry (it's where I'm placing my bets). If we want a *bona fide* science of logic, we may have to put aside our qualms about norms and nature long enough for reductive programs like that in Cooper's book to reach maturity. Only at that point should we pass judgment on whether two great tastes in fact taste great together.

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