review of BOUNDED RATIONALITY

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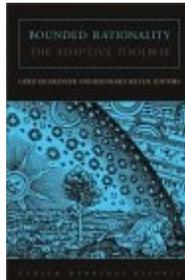
Bounded Rationality

The Adaptive Toolbox
by Gerd Gigerenzer and Reinhard Selten (Editors)
MIT Press, 2001
Review by Adriano Palma, Ph.D. on Apr 22nd 2004

Even intuitively standard descriptions of what rational behavior consists of face strange difficulties. I cite two instances. It is fairly common to think that rational action entails some element of choice. Nobody is rational in breathing, since nobody decides to breath. Choosing seems to entail a range >1 of potential outcomes. One is supposed to survey mentally, as it were, the field of available choices. Secondly to (try to) assess their foreseen or foreseeable consequences. Thirdly establish a hierarchy by means of a matching procedures between outcomes and one's own prior preferences.

A weird remark: much of our mental life (where "we" comprises many humans in leisure societies) is spent in finding out what to do at all, not really in assessing means to ends. Often we do not know what our ends are. This is however an external problem: we do not really know in which sense people have preferences and why they have those they do have. Note that in any event there is always an element of choice, albeit a non conscious one. Lifetime is a scarce commodity and doing "nothing" is a choice after all on the allocation of such a commodity. The issue of what forms, if anything, preferences is best left to some other occasion.

Closer to the issues in the text under review is a second almost paradoxical aspect of rationality thus

conceived. The elementary scheme above entails that one has to make hard choices. It may very well be the alternatives that come to mind are not exhaustive. In principle they are never exhausting physical, let alone logical, possibilities. What tells me that the set of alternatives I consider is the good one? One may very well concoct an infinity of situations in which the only "rational" thing to do is keep searching for more and/or better alternatives. But notice that this process itself is time/energy consuming hence it is a choice in allocating my one and only lifetime. This is in a semitechnical language known as a stopping problem. And it leads to a vicious circularity: one has to perform the very same task to know when it is bet to keep looking and when it is best to stop looking and make do with what one can come up with. And this entails another search and so forth. The standpoint taken by this collection is partly derived from the "satisficing" approach advocated by one of the founders of modern behavioral science, H. Simon. When a subject satisfices she stop searching at any time an alternative is found that is as high or better than a pre-fixed aspiration level. One of the editors (Reinhard Selten) has improved this approach.

The general idea of the collection is to explore an adaptive toolbox (yet another mental box for the cognitively inclined.) The box contains heuristics: methods that can deliver choices within strict boundaries and that are, on the face of it, fairly irrational in an intuitive sense. Why should I believe that the best stock to pick in trading session in the stockmarket is the one whose name I recognise? The present collection provides some evidence and some answers.

The adaptive toolbox is supposed to be shaped at once by internal constraints and by environmental pressures. The constraints are fairly easy to recognize: no (human) agent has infinite memory or computing power to actually solve optimization problems by brute force. The environmental pressure is a subtler contribution of Gigerenzer et al.'s approach. A strategy within the toolbox may match in structural properties an environment (p. 46) and may be robust in being able to generalize well. The main idea behind the research program is to look at the evidence we have that could explain our reliance on heuristics. And many of the papers here do provide experimental evidence. To the

mind of this reader two questions stand out here. It is fairly clear that we do adopt heuristics, fast and frugal, the simplest probably is based on mimicry. It is also fairly clear that we can adopt more traditional methods. The evidence and theory here displayed is impressive. In Goldstein et al. (Ch. 10) the question comes to the fore. "Which homunculus selects among heuristics, or there is none?" (p. 188). My own question is: how do we select between the frugal adaptive toolbox and the more cumbersome and austere traditional "optimizing" model? It is my opinion that we do not have a proof yet that only heuristics are used in decision making.

On the critical side, the book turns out to be very uneven. Possibly this is not avoidable in a collection that reports a variety of approaches (from cultural anthropology to algorithm theory) and research in progress. The most interesting part, for the psychologically minded are probably those that deal with emotions (see in particular ch. 15.)

But the absolutely most fascinating section deals with an extremely clearheaded treatment of a problem that may baffle us. We often conceive of organisms as single individuals (Adriano chooses to write an article and Christian decides whether to publish it or not.) Nature in its weird wisdom appear to display a different kind of choice-making apparatus. Consider that swarms of bees have to decide where to place their next colony once they have to move out of one home site. T. D. Seeley (ch. 15) produces an extremely beautiful account of the fact that completely idiotic single-bee-level mechanisms (and not well understood ones, see p. 260) crank out decisions followed by the entire swarm. Alternatives are evaluated, though each bee scout visits one and only one site, by having all of them dance to signal locations. The mechanism of the debate is somewhat unclear (see p. 258 on comparative vs. noncomparative tactics); but evidence appears to point in the direction of the "loser" bees dropping out of the debate far more than by "persuading" anybody or anything of the superiority of their finds. The key conceptual point here is a super-organism (the swarm) may reach a decision (and an effective one at that – bees consistently pick better nests in experimental settings) without having any central authority and any particularly clever single-organism member.

The implication for human decision making may be stark to be stared in the face. We decide nothing at all, we are assemblies of bee-like mechanisms, some fast and frugal heuristics, some dumb and cumbersome rationalistic -Leibnitzian computers. The consequences on the ethics and deontology of the way we treat ourselves and even our own psychopathologies may be immense.

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