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Professors Axel Leijonhufvud
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Dear Friends,

I want to share some first impressions on my reading of “Computable Economics.” (I confess that “reading” did not include going through all the proofs.) I was delighted and impressed by the mileage you could make with Turing Computability in showing how nonsensical the Arrow/Debreu formulation, and others like it, are as bases for notions of human rationality. Perhaps this will persuade some of the formalists, where empirical evidence has not persuaded them, of what kinds of thinking humans can and can’t do – especially when dealing with the normative aspects of rationality.

As the book makes clear, my own journey through bounded rationality has taken a somewhat different path. Let me put it this way. There are many levels of complexity in problems, and corresponding boundaries between them. Turing computability is an outer boundary, and as you show, any theory that requires more power than that surely is irrelevant to any useful definition of human rationality. A slightly stricter boundary is posed by computational complexity, especially in its common “worst case” form. We cannot expect people (and/or computers) to find exact solutions for large problems in computationally complex domains. This still leaves us far beyond what people and computers actually CAN do. The next boundary, but one for which we have few results except some of Rabin’s work, is computational complexity for the “average case”, sometimes with an “almost everywhere” loophole. That begins to bring us closer to the realities of real-world and real-time computation. Finally, we get to the empirical boundary, measured by laboratory experiments on humans and by observation, of the level of complexity that humans actually can handle, with and without their computers, and - perhaps more important – what they actually do to solve problems that lie beyond this strict boundary even though they are within some of the broader limits.

The latter is an important point for economics, because we humans spend most of our lives making decisions that are far beyond any of the levels of complexity we can handle exactly; and this is where satisficing, floating aspiration levels, recognition and heuristic search, and similar devices for arriving at good-enough decisions take over. A parsimonious economic theory, and an empirically verifiable one, shows how human beings, using very simple procedures, reach decisions that lie far beyond their capacity for finding exact solutions by the usual maximizing criteria. A recent example that I like is the work of Shyam Sunder (now at Yale, alas) and his colleagues on the equilibrium of markets with “stupid”

traders, and the near indistinguishability of such markets from those with optimising traders. When we have remade economic theory on that model, we will be able to write honest textbooks.

So I think we will continue to proceed on parallel, but somewhat distinct, paths for examining the implications of computational limits for rationality – you the path of mathematical theories of computation, I the path of learning how people in fact cope with their computational limits. I will not be disappointed however if, in the part of your lives that you devote to experimental economics, you observe phenomena that seduce you into incorporating in your theories some of these less general but very real departures from the rationality of computational theory. This seems to me especially important if we are to deal with the mutual outguessing phenomena (shall we call them the Cournot effects?) that are the core of game theory.

I am sure that you will be able to interpret these very sketchy remarks, and I hope you will find reflected in them my pleasure in your book. While I am fighting on a somewhat different front, I find it greatly comforting that these outer ramparts of Turing computability are strongly manned, greatly cushioning the assault on the inner lines of empirical computability.

Once again, thank you very much for sending your fine book. Please continue to keep me in touch with your work. I'll send along some recent reprints of mine.

Cordially,

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and Psychology