Our mind's chief asset

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Andy Clark

BEING THERE
Putting brain, body, and world together again
269pp. MIT Press. £19.95.
0 262 03240 6

Once upon a time, behaviourism ruled the land, and icy blasts of reinforcement extinguished all thought, all feeling, all mentality. The world was a dead mechanism. And then one day, a knight in shining armour, Sir Chomsky, slew the fearsome dragon, Skinner. Soon thereafter, Martin Minsky and Seymour Papert imprisoned the dimwitted Perceptron in its own maze, and the free play of symbol systems could be heard throughout the land. They were physical symbol systems, not immaterial symbol systems, for in spite of the Cartesian banner carried by Sir Chomsky, this was a triumph of materialistic mentalism, not dualism. Those were the Good Old Days, when the GOFAI twins, Newell and Simon, and their wizard, McCarthy, showed how to study the mind while ignoring the brain. (This was a blessing indeed, since the brain was revoltingly complicated, and it was hard enough just devising flow charts of the mind.)

The spring of Cognitive Science was thus begun. But soft, what murmurs did we hear rising from the mists? The various brain-scientists so rudely left out of the festivities began to show signs of making rapid progress; no longer merely electricians and plumbers down in the basement, they began to call themselves neuroscientists, and even cognitive neuroscientists. Descendants of the Perceptron, long believed dead, began to breed like mayflies – neural nets and their kin, under the banner of Connectionism. Soon this was followed by yet another wave of pretenders to the throne: Dynamical System theorists and their some time allies, Darwinians of various stripes, demanding a more biological, more evolutionary perspective on the mind. Cognition had to be Situated, or better yet, Embodied, and the siren song of Chaos was heard up and down the land. The ideological battles were joined, with Top-Down pitted against Bottom-Up, Neats versus Scruffies, Rationality versus the Wisdom of the Body.

Time out. Wouldn't it be nice to replace these ideology-saturated fairy-tales with a unified, judicious vision of the progress that has actually been made, a survey of the state of play today that captured what is powerful and promising in these new ideas without succumbing to the hype? A fine prospect, but how could any writer be both detached enough to give a sympathetic account of all the rivals while engaged enough to contribute to the advance of the cutting edge? I don't know, but somehow Andy Clark has done it. (It is no saltating miracle on his part, in any event. This is Clark's third book on these topics since 1989; he started strong and has shown steady improvement.)

Clark is a sympathetic student of all these movements, yet not taken in by them. He has read a huge amount, and then pushed his scholarship through a first-rate sanity sieve, so that his book compactly explains the current wisdom, while firmly, gently resisting the more radical ideologies. If you have wondered what to make of, say, the Dynamical Systems bandwagon, you get a fair account here – the best I have seen – along with an undeluded dismissal of some of its wilder claims. Connectionism, too, has never been better explained. Others have also done superb jobs explaining connectionism; what sets Clark apart is his astute appreciation of the virtues of the various traditions that connectionism sought to supplant.

As if this weren't enough, Clark has a bounty of ideas of his own, and they are, I think, very good ones. (I should acknowledge that he and I have been playing leap-frog with some of these ideas in recent years, so others should be consulted about just where we're leading each other. We're going up or down together, in any case, and he's in the lead most of the time.)

Two central ideas generate most of the others. The first is that human beings offload as much of their minds as possible into the world. David Rumelhart was perhaps the first of the new wave of theorists to point out the importance of this fact, but Clark adds value along with detail. As Clark puts it, "We use intelligence to structure our environment so that we can succeed with *less* intelligence. Our brains make the world smart so we can be dumb in peace!" The second concerns language, which has been recognized since Descartes's day to be the manifestation of mentality that sets the human mind in a class by itself. Clark shows that language can be excellently illuminated by being considered to be part of the structured *external* environment. Philosophers with fond memories of Ryle and Wittgenstein may think this is old hat. Yes, yes, thinking is a social phenomenon that happens out in public view, for the most part. But Ryle and Wittgenstein and their philosophical followers had no taste for the further, scientific question: How on earth does it happen? Clark shows how we can begin to address this question, once we see language as a set of cognitive and social tools that itself evolves to fit the brain, as the brain evolves to exploit it. The simplistic idea of a "language of thought" hard-wired in the brain gets replaced by a more layered, versatile set of structures. Words and other linguistic constructions,

> thus viewed, are a new class of objects which invite us to develop new (non-language-based) skills of use, recognition and manipulation. Sentential and non-sentential modes of thought thus coevolve so as to complement, but not replicate, each other's special cognitive virtues.

Ever since Chomsky created modern linguistics, it has been clear that the combinatorial power of language, the "productivity" of grammar that permits us to create and comprehend a virtual infinity of novel meanings, is our mind's chief asset. How, though, did it evolve, and how does the brain make it work? Chomsky and his disciples turned their backs on these questions, deeming them unapproachable by their methods (which is true enough), but also discouraging any attempt to adopt an expanded perspective that could address them. That self-imposed tunnel vision is now being opened wide, and many tantalizing new vistas are revealed. Clark's book provides a front-line vantage point and good suggestions about the best paths to pursue. These are exciting times in cognitive science, and anybody who wants to get in on the fun should read this book.

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