

**Margaret A Boden**, *Mind as machine: a history of cognitive science*, 2 vols, Oxford, Clarendon Press, 2008, pp. xlviii, total pp. 1631, £50.00 (paperback 978-0-19-954564-3).

Almost all the reviewers of Margaret Boden's *Mind as machine* have noted the obvious: at 2 volumes, 1452 pages, 134 pages of references, and seemingly infinite parenthetically cross-references, this book, longer than most editions of *War and peace*, is impractical, unwieldy, and inaccessible to readers. To be blunt, that seems to be the point. Boden did not intend *Mind as machine* to be a pleasant read for a weekend's leisure. She intended it for people whose work includes being active readers, and for them it does represent a useful work of synthesis.

Boden begins by noting that some might mistake "man as machine" for an ancient idea. Yet, according to her, this analogy, as well as its parallel "mind as machine", is of recent origin. It was only by the close of the nineteenth century that mechanistic theories of mind acquired respectability. These theories, however, were mere analogies; no one seriously contemplated consilience between the behaviours of machines and men. Still less did anyone outside science fiction circles propose that machines could be intelligent in the same way as humans. By the mid-1800s, Charles Babbage had invented an analytical engine, somewhat akin to a programme-controlled digital computer, but he never claimed it to have implications for psychology or biology, though perhaps his student Ada Lovelace hinted at the possibility. Thus, it was during the war years of the 1940s, at the height of collaborations between Anglo-American scientists, that computers began being developed, and with them, some investigators, such as Alan Turing, began to study questions about machine intelligence. These questions would have ramifications for the cognitive sciences, including the hypothesis that a scientific theory might explain, "processes in both minds and mindlike artefacts" (p. 168).

In the 1950s, these claims led to the emergence of the multi-disciplinary field of the cognitive sciences, a discipline well provided for by philanthropic and institutional sources of support, stocked with new venues for publication, and bolstered by artificial intelligence research paradigms. It was, none the less, a field riddled with intellectual divides, which developed over the next half century. Behaviourism, then predominant, was on the wane. Seen as too universalist, it was criticized by Gestaltists, linguists, ethologists, proto-connectionists, anthropologists, and Noam Chomsky alike (the last comes bizarrely in Boden's narrative with a "health warning", p. 591). In this ferment, the "mind as machine" debate took different paths: cyberneticists, for example, assumed that the mind as a machine was identical with the body. Computational psychologists—little more than a smattering of research endeavours—treated the human mind as different from its body, and concerned themselves with questions about *how* the mind was different. The majority of psychologists, however, focused on *what* made the mind different. Always lurking in the background was the question of whether human thought was "constituted by, or identical with" symbolic processes (p. 702). Those questions especially plagued papers and programmes on artificial intelligence—even when their authors were uninterested in the answers.

Artificial intelligence research bolstered this nascent field enormously during the last half of the century. AI research, however, was perhaps more tied to the geopolitical context of the Cold War period and the neo-Liberal period of the 1980s and 1990s than the cognitive sciences. While much AI work focused on developing programming languages and had modest goals (seek general intelligence but not human-like intelligence, appeared almost as an injunction), critics levelled numerous charges at AI-workers, despite the fact that few were seeking to understand the human mind as a machine. Seymour Papert, an early pioneer, for instance, used only simple programmes to understand

thinking processes. Yet, as defence spending increased, AI's proponents and detractors became uncomfortable with the glib assertions being promulgated within policy and media exaggerations, especially the belief that enormous computer systems controlling weapon systems could be "bug" free in their script, and commonsensical in their behaviour. This political and social context was only a part of the story. Connectionists, a new but inchoate group of psychologists, neuroscientists, and philosophers of the mind, also tore into the AI project. They argued that phenomena were represented within emerging networks (usually neurological) and not symbolic systems, which many within old-fashioned AI paradigms had claimed. In hindsight, all of AI's failed promises and faulty philosophical assumptions have led some to pronounce it a failed research programme. On this point, Boden demurs. She observes that AI enormously advanced both itself and the cognitive sciences. In that sense, and contrary to its critics, AI continued as a fruitful area of research, but like its latest corollaries, computational neuroscience and artificial life, the field remains embryonic even today.

Whether Boden's volumes really ought to culminate in a penultimate discussion of the philosophies of *mind as machine* or in a final summary in the last chapter of triumphal sounding claims for the cognitive sciences, I shall leave to others to decide. Having read those chapters alongside M R Bennett and P M S Hacker's excellent *Philosophical foundations of the neurosciences* (2003), I find myself having misgivings about the conceptual foundations of much of the cognitive sciences project as outlined by Boden.

In any case, Boden's volumes, despite their evident value, will aggravate many. Those least charitable will see them as a rather devoted effort to restore attention to Warren S McCulloch's contributions to the cognitive sciences. Historians studying periods before 1945 will find fault both with her facts and pithy generalizations. Similarly, those still living cognitive scientists whose careers spanned 1945 and 2000 are bound not to

recognize the caricatures of themselves, or people they knew, in her story. Instead they will likely encounter a narrative that for them fails to capture things "as they were" and summarizes scientific arguments without paying them full justice. Such criticisms, which have already begun circulating about this work, strike me as unwarranted, especially because Boden's practitioner viewpoint brings with it the hindrances such life experience implies. Anyone failing to note Boden's polemical tone is just not awake. Putting it simply, the work is too large to be free of an agenda. However, for that same reason, criticisms of this work from other practitioners appear no less problematic. In my view, these volumes and the responses of critics to them will be of greater significance as primary source material than they will be in defining the historiography of the cognitive sciences. On balance, these volumes are thought provoking and open a doorway towards improved understanding of the patterns of science in the second half of the twentieth century.

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**Ulrike Enke** (ed.), *Die Medizinische Fakultät der Universität Giessen: Institutionen, Akteure und Ereignisse von der Gründung 1607 bis ins 20. Jahrhundert*, Stuttgart, Franz Steiner, 2007, pp. 450, illus., €72.00 (hardback 978-3-515-09041-4).

This book is the first of a three-volume publication and is the result of a 2005 symposium focusing on the 400-year history of the medical faculty of the Hessian town of Giessen in Germany. The dual focus of the seventeen contributions to this initial volume is both on medicine as a work and research discipline in a small university town, and on life within (and with) the institution itself, from its inception in 1607 to the times of the Weimar Republic.

In chapters dealing with matters as diverse as the establishment of a maternity house, the