Don Ihde and Evan Selinger (eds.), ***Chasing Technoscience. Matrix for Materiality***. Bloomington and Indianapolis: Indiana University Press (2003), xii+249 pp., $54.95 (cloth), $27.95 (paper).

According to its front cover, this book aspires to be "a state-of-the-art view of technoscience studies, featuring the work of Donna Haraway, Don Ihde, Bruno Latour and Andrew Pickering." The volume has a hybrid structure. Its first part includes chapters by and interviews with the four protagonists. In part two, the views of these scholars are explained, compared, and evaluated in pairs in six commentaries. Thus, the latter chapters carry such titles as "Hypertext: Rortean Links between Ihde and Haraway" and "Latour and Pickering: Post-human Perspectives on Science, Becoming and Normativity." As these titles suggest, this is not mainstream philosophy of science. Yet, the book addresses important philosophical issues that ought to be taken seriously by mainstream philosophers as well.

In his contribution, Bruno Latour discusses the constructivist approach to science and technology. He explains what the construction metaphor does and does not imply. In his view, constructivism allows us to see the stability and solidity of science and technology as features of a building which has been made by a variety of human and non-human actors but which neither possesses nor needs unquestionable foundations. From this perspective, Latour crititizes both social constructivists, who wrongly search for an exclusively social understanding, and deconstructionists, who fail to do justice to the stability and solidity of science and technology.

The main subject of Donna Haraway's chapter is the relationship between nature and culture, as it shows itself in scientific and technological practices and in (both specialist and popular) texts about those practices. Like Latour, she opposes dualist accounts of this relationship, which is why she often writes of "natureculture." Thus, she claims that it is not humans who were the prime actors in the domestication of wolves into the companion species of dogs. Instead, the wolves domesticated themselves by entering into a symbiotic relationship with the humans. More generally, inspired by Whitehead's philosophy, Haraway opts for a radically relational and processual ontology.

Andrew Pickering's motto is that, "everything becomes in relation to everything else and nothing is fixed" (96). All entities are "assemblages" and constantly in flux. This Heraclitean metaphysics of becoming is meant

to apply to both human and non-human entities. Thus, evolutionary biology provides many examples of the emergence of novelty in nature. In experimental science and in technology, becoming can be found in the always changing human-machine relationships. And even knowledge claims that appear to be atemporal at first sight, always prove to be in the process of becoming "mangled," and thus modified, in the material, social and conceptual practices of science. Pickering emphasizes the metaphysical nature of his views. Notwithstanding his illustrative appeal to evolutionary theory, he refrains from any realist commitment to specific sciences of becoming.

In the last of these chapters, Don Ihde sketches his development from a "Continental" phenomenologist to a philosopher of technology and, now, to a "post-phenomenological" student of technoscience. Ihde's focus is, and has been, on the different relations between technologies, human beings, and the world. He emphasizes that relating to non-humans is essential to being human, but his ontological views are less radical than those of the other three protagonists. Thus, while he agrees that it makes sense to attribute agency and (some) intentionality to (higher) animals, he is critical of treating human beings as ontologically on a par with inanimate things, such as speed bumps or door stoppers. At a more fine-grained level, he discusses the differences between dogs and "quasi-animals," like the Japanese entertainment robot AIBO, and concludes that such robots are closer to a "quasi-deity" than to a companion animal.

The interviews both develop certain substantive themes and include some biographical information. Bruno Latour, typically, denies any consistent philosophical position attributed to him: "I produce books, not a philosophy" (19). Donna Haraway stresses the critical dimension of her work, "in the sense that things might be otherwise" (52) without taking an antiscientific stance, however. Andrew Pickering is still the aggrieved angry young man, who has been treated "cruelly" by his former colleagues in sociology and who is "fed up" by requests for clarification of his basic concepts by "Pavlovian" philosophers and social scientists (83, 92). Accordingly, he mostly evades the sensible questions posed by his interviewer. Don Ihde, finally, takes the role of the intermediary, who aims to consolidate the new field of technoscience studies and cares for its philosophical nature.

The quality of the commentary chapters is somewhat variable. Some really do advance the debate on the subjects in question (for example, Evan Selinger's piece on Haraway and Pickering), while others hardly go beyond summarizing the views of the authors under discussion. Taken together, these contributions provide a useful explanation of the (not always easy to grasp) views of the four protagonists. But because each

of them is being discussed three times, there is a certain amount of repetition as well.

Since the book's aim is to provide an up-to-date review of its subject, it is not suitable as an introduction to technoscience studies. Hence, newcomers are advised first to study other work in this area, such as Latour's *Science in Action*, Haraway's *Simians, Cyborgs and Women*, Ihde's *Technology and the Lifeworld*, and Pickering's *Mangle of Practice*. The present book may then be used as an additional source for further explanation and more recent developments.

By now, it will be clear that there is a world of difference between the average article published in *Philosophy of Science* and the subjects and approaches summarized above. To their credit, these technoscience studies address a number of subjects which are important from both a philosophical and a socio-cultural perspective. First, since the second half of the nineteenth century, science and technology have become increasingly interwoven, sometimes to the point of becoming indistinguishable (just think of biotechnology or computer science). This is why the book speaks of "technoscience." Furthermore, the empirical study of technoscience—and of experimentation as the crucial link between science and technology—naturally leads to a focus on materiality. In contrast to theory-biased philosophical thinking, the book emphasizes "the ways in which materiality plays subtle and deep roles in our ways of moving about in the world" (1). Hence, the focus is on technoscientific practice rather than on the relationship between theoretical, propositional knowledge and a material world. Finally, philosophical reflection on technoscientific practice confronts us with important questions about the relationship between humans and non-humans, for instance ontological, socio-cultural, and ethical questions relating to the genetic modification of (parts of) animals and human beings. Traditional philosophy of science has, mostly, neglected such subjects and thus it can provide, at best, a partial account of the practice and content of contemporary science. No wonder that most outside observers see present-day philosophy of science as irrelevant to the broader and bigger issues of our technoscientific culture (cf. Churchman 1994).

Does this mean that philosophers of science should simply swallow all the philosophical perspectives and views summarized above? By no means! As I have already hinted, quite a few of the philosophical themes need an analysis that digs deeper and is both more differentiated and more comprehensive. In this brief review, a systematic backing of this claim cannot be provided (for this, see Radder 1996), but the following observations illustrate the point.

A major problem is the erection of strawmen. This problem arises most clearly in the approaches of Latour and Pickering, in this book as well

as in their other work. They launch general criticisms of, for example, realist and representationalist interpretations of science but never take the trouble to expound in detail at least one of the many different interpretations that can be found in the literature. If Latour himself does not want to draw a distinction between ontology and epistemology, that is up to him. But it is inappropriate to construe the views of his realist opponents as if they do not make this distinction either (32–33). Remarkably enough, one of the commentators, Evan Selinger, makes a similar point for the case of Pickering even more sharply: "Pickering intentionally presents uncharitable descriptions of rival positions to make his work seem more novel than it actually is" (153).

A further problem pertains to the way in which normative issues are addressed. Throughout the different chapters there is some discussion of the normative problems of technoscience, including the normative significance of technoscience studies itself, but the overall result is disappointing. As I mentioned above, Haraway advocates a critical stance toward technoscience but what this implies for her discussion of companion species and dog breeding remains unclear. Perhaps this is a consequence of the unfinished nature of her contribution, which she describes herself as, "a chapter of fragments, of work-in-progress, of dog-eaten props and half-trained arguments" (60). Furthermore, in his contribution, Aaron Smith claims that ethical debates (for instance, on the issue of brain death) could benefit from Ihde's approach (186). The only thing we learn, though, is that the relevant technologies should be taken into account in such debates, but there is nothing about the *specific* contribution that Ihde's account of those technologies might make. Finally, Casper Bruun Jensen endorses Latour's suggestion that "scientific work is ethical when it tries to activate and articulate as many actors as possible and make passive as few as possible" (235). On this criterion, not just the construction of onco-mice but also the creation of "onco-men" would be an excellent example of ethical scientific work. Yet, such problematic consequences are not even noticed, let alone systematically discussed and assessed.

Thus, the book confirms the longstanding criticism of the superficial and problematic position of normative (either ethical or political) reflection within science and technology studies (Radder 1996, chs. 5 and 8). In the present case, the obvious source of the problem is the claim that humanist concerns are outdated and inadequate. From such an antihumanist perspective, by the way, those (few) accounts in the philosophy of science that do focus on social and political issues (e.g., Longino 2002; Kourany 2003) would be taken to be deficient as well.

The above criticisms should not be misunderstood, however. The philosophical deficiencies do not, and should not, detract from the significance

of the subjects addressed in this book (technoscience, materiality, ontology). As I argued above, taking these subjects fully into account remains an important challenge for philosophers of science. Some philosophers have already taken up this challenge. Thus, a thoughtful interpretation of the philosophical significance of the (mostly descriptive) studies of technoscientific practice has been provided by Thomas Nickles (1992). Furthermore, recent work in the philosophy of scientific experimentation has underlined the significance of materiality for ontological and epistemological questions (see various contributions to Radder 2003). Finally, the problem of how to reconcile naturalism and normativity has been discussed in great detail by Joseph Rouse (2003) in a way that is congenial to the views of the protagonists of *Chasing Technoscience*.

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