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CONTENTS

Special Collection: Pragmatist Ethics in the Technological Age

Guest Editor, Jozef Keulartz

JOZEF KEULARTZ, Introduction 1

HANS RADDER, Pragmatism, Ethics, and Technology 10

VINCENT COLAPIETRO, The Pragmatic Turn 19

JOSEPH PITT, Ethical Colonialism 32

JOZEF KEULARTZ, MICHIEL KORTHALS, MAARTJE SCHERMER, & TSJALLING SWIERSTRA, Pragmatism in Progress: A Reply 38

Articles

SUNGOOK HONG, Man and Machine in the 1960s 49

IAN STONER, In Defense on Hyperlinks 79

DAVID E. TABACHNICK, Techne, Technology, and Tragedy 91

Reviews

van AMERONGEN, "The Moral Designer," a review of *Ethics in Engineering Practice and Research* 113

STEPHEN CROWLEY, "The Power of Positive Thinking," a review of *Knowledge and Reality: An Essay in Positive Philosophy* 127

CRAIG HANKS, A Review of *Philosophical Tools for Technological Culture: Putting Pragmatism to Work* 130

SHAWN SMITH, "Tool-Being: Through Heidegger to Realism," a review of *Tool-Being: Heidegger and the Metaphysics of Object* 136

Introduction

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This issue of Techne is devoted to *Pragmatist Ethics for a Technolgical Culture*, a volume edited by Jozef Keulartz, Michiel Korthals, Maartje Schermer and Tsjalling Swierstra. This volume is the result of research carried out within the framework of the Incentive Program Ethics and Political Issues, which is supported by the Netherlands Organization for Scientific Research. The aim of this research was to find and develop a form of ethics tailored to the moral problems and social conflicts that are typical for a technological culture.

Pragmatist Ethics for a Technological Culture was the topic of a panel discussion at the Annual Meeting of the Central Division of the American Philosophical Association in Cleveland, Ohio, April 26, 2003. The panel discussion was organized by the Society for Philosophy and Technology and was chaired by Diane Michelfelder (Indiana State University). This issue includes the papers presented by Joseph C. Pitt (Virginia Tech), and Vincent Colapietro (Pennsylvania State University), and a paper of Hans Radder (Free University of Amsterdam, together with a reply of the editors of the volume.

In this introduction I will first sketch the outline of the volume under discussion and I will next give a brief impression of the comments of Radder, Colapietro and Pitt.

Pragmatist Ethics for a Technological Culture

Neither traditional philosophy nor current applied ethics seem able to cope adequately with the highly dynamic character of our modern technological culture. This is because they have insufficient insight into the moral significance of technological artifacts and systems. Here, much can be learned from recent science and technology studies (STS). They have opened up the black box of technological developments and have revealed the intimate intertwinement of technology and society in minute detail. However, while applied ethics is characterized by a certain "technology-blindness," the most influential approaches within STS show a "normative deficit" and display an agnostic or even antagonistic attitude towards ethics.

This impasse can, the editors of *Pragmatist Ethics in a Technological Culture* believe, be broken by a re-evaluation of pragmatism. Pragmatism shares with science and technology studies its central insight in the co-evolution of technology and society, but it differs from STS in that it gives serious ethical consideration to the associated normative implications. In order to substantiate this claim the editors have first sketched the contours of a pragmatist ethics, which is better equipped to dealing with the problems of a technological culture than are traditional forms of ethics. Pragmatist ethics does imply a number of interconnected changes of emphasis: from epistemology to methodology, from product to process and, above all, from justification to discovery. This first sketch was presented as a discussion paper to six experts in the fields of pragmatism, STS and bioethics, with the request to write an elaborate reaction. These six papers were supplemented with three more papers in which the editors further developed their first sketch of a pragmatist ethics. This total of nine papers formed the subject matter for a two-day workshop held in June 2001 in Wageningen, The Netherlands.

Pragmatist Ethics for a Technological Culture consists of these nine papers, all with brief comments by one of the conference participants. The editors' first discussion paper forms the prologue, while as an epilogue they have added an extensive evaluation and processing of the results of the workshop. Apart from the prologue and the epilogue, this volume consists of four parts: "Technology and Ethics," "The Status of Pragmatism," "Pragmatism and Practices," and "Discourse Ethics and Deliberative Democracy."

Technology and Ethics

The first part opens with a paper by Larry Hickman. In this paper, Hickman calls to mind the determination which with classical pragmatists rejected the metaphysical idea that there are transcendental truths or the religious idea that there are revealed truths. Hickman's reminder is by no means superfluous because foundationalism is still very much alive. It flourishes in some branches of environmental philosophy where foundations are searched for in the earth, not in the sky. It also plays an important role in popular debates concerning biotechnology. Hickman is convinced that as long as we continue to appeal to foundations, whether they be projected up into the sky or planted down in the earth, the problems and prospects of our rapidly changing technological landscape will not be adequately addressed. Hickman defends a version of experimental naturalism or instrumentalism, that centers on the notion of

technology in the broad sense in which Dewey used it, namely as the study of our tools and techniques. He demonstrates the relevance of Dewey's concept of the thought experiment as a "dramatic rehearsal" for problem solving and decision making in bioethics by exploring the case of genetic screening.

Maartje Schermer and Jozef Keulartz take the case of *In Vitro Fertilization* (IVF) to explore the consequences and effects a new technique can have on society and the way traditional bioethics deals with technological developments. They analyze the shifts in moral responsibilities and social roles and relationships that IVF has caused and give an overview of the debate on IVF as it has taken place in the field of bioethics. Though this debate does already show some pragmatist traits, Schermer and Keulartz propose a more explicitly pragmatist approach and demonstrate what this would imply for the debate on IVF. Schermer and Keulartz focus on the novel character of IVF and show the emergence of a new entity ("the embryo"), of a new medical practice (productive in stead of curative) and of new (family) relationships. The embryo as a new subject, resulting from the separation of the embryo from the body of its mother, has been discussed at length in bioethics. This was not the case, however, with respect to the shift from curative to productive medicine nor with respect to the emergence of new family relationships.

The Status of Pragmatism

The second part opens with an article of Andrew Light who is rather sceptical about the proposal of Keulartz et al. for a pragmatic reform in applied ethics. As a form of applied ethics, Light contends, bioethics is already pragmatic: it is a social activity, strives for solutions, relies on experience and is policy-oriented. To adequately apply a moral theory in practice to actual problems in the real world some form of casuistry is required, and it is this commitment to casuistry that accounts for the inherent inclination to a pragmatist methodology in bioethics. But embracing such an inherent methodological pragmatism does not at all compel us to have recourse to the teachings of Dewey, James, Pierce or Rorty. Quite the contrary, Light insists, we better refrain from such an explicit reference to more pure philosophical versions of pragmatism.

Glenn McGee takes a view that is contrary to Light's. Whereas Light urges us to refrain from explicit recourse to pragmatism and from philosophical exegesis of classical texts, McGee is alarmed precisely by the circumstance that pragmatism in bioethics and other forms of applied ethics is divorced from the

epistemological problems at the core of classical American philosophy. The focus on the issues at hand should not go at the expense of a careful treatment of the problem of foundations. If we neglect this problem, McGee warns us, we run the risk that pragmatism in bioethics will degenerate into a dressed-up form of relativism. Of course a pragmatist conception of epistemology is quite different from the Cartesian conception. For pragmatists, McGee claims, knowledge is not grounded by some pre-given reality apart from experience, but is, quite the reverse, formed and textured by the "everyday" experience of the common world.

Pragmatism and Practices

The main contributions to the third part deal with animal ethics, medical ethics, and environmental ethics, and are inspired by the works of MacIntyre, Foucault and Aldo Leopold successively.

In his contribution, Michiel Korthals criticizes various schools of animal ethics from a pragmatist perspective. He proposes an approach that takes into account the various practices in which the interaction between animals and humans takes shape. Following MacIntyre, Korthals defines practices as social activities with their own good, standards, values and goals, skills or excellences, and typical forms of organization. He distinguishes five human-animal practices: livestock, companion animals, captive animals (zoo animals), de-domesticated or wild animals, and animals used in experiments. This "multi-practices approach" takes into account the diversity and dynamics of the contexts in which animals are living and are managed by humans, and puts the emergence of ethical complications and controversies in a new light.

In his paper on the emerging practice of predictive medicine, Gerard de Vries argues with Glenn McGee that it is an important task of a pragmatist epistemology to make explicit what has hitherto been implicit. Whereas McGee goes back to the phenomenological reflections of Edmund Husserl and Richard Zaner, De Vries follows Robert Brandom who made an interesting attempt at a pragmatic reconstruction of Kant's transcendental method. However, De Vries draws most of his inspiration from Michel Foucault, whose archeological and genealogical methods he considers as historicized versions of a Kantian critique. In his book on the birth of the clinic, Foucault tried to uncover the cognitive, cultural, social and physical conditions that made modern clinical medicine possible. As De Vries points out, these "conditions of possibility" change with the

present shift from clinical to predictive medicine. This shift not only involves a radical reconceptualization of health and disease, it also includes far-reaching changes in the distribution of roles and responsibilities of physicians and their patients and also in the social organization of the health care system at large. These changes, De Vries argues, will profoundly affect medical ethics as well.

Bryan Norton sketches a pragmatist epistemology that is adequate to the practice of Adaptive Management, a specific approach to environmental monitoring and management. He examines how Adaptive Management can deal with uncertainty with regard to the effects of current actions on future developments and on sustainability. From Aldo Leopold on, Adaptive Managers have explicitly appealed to pragmatist ideas and ideals in support of their plans and activities. Adaptive Management can be characterized by three central commitments: a commitment to an experimentalist method of inquiry, a commitment to examine the impacts of our actions on multiple scales of time and space, and a commitment to examine each problem in its local context. In short, Adaptive Management is an experimental, multi-scalar, place-based management.

Discourse Ethics and Deliberative Democracy

In the fourth part, Paul Thompson discusses at length the merits *and* the difficulties of Habermas' work on discourse ethics. The flaw in discourse ethics, according to Thompson, lies in its tie to an ideal discourse situation, as characterized in Habermas' theory of communicative action. As Foucault has shown, discourse is never purely communicative, but always involves strategic elements. That's why, according to Thompson, his work should be seen as part and parcel of a pragmatist practical ethics that is sensitive to the strategic potential of explicitly normative discourse. Furthermore, Thompson points out that any actual proposal that stipulates rules and procedures is itself bound up by considerations of time and place and will therefore be open to re-evaluation and revision. Instead of an ultimate definition we only have a "working understanding" of what a fair, non-coercive and open discourse should look like under the best approximation of ideal conditions.

Tsjalling Swierstra analyzes two public debates in the Netherlands on new medical technologies, the so-called New Reproductive Technologies (NRTs) on the one hand, cloning on the other. At the center of his pragmatist approach is the notion of a moral vocabulary, understood as a situated response to specific, local practical questions. Swierstra shows that such vocabularies do not have to remain

confined to their context of invention, but can sometimes be transported successfully to other contexts. Two of such vocabularies determine the public controversies studied. The "vocabulary of normative nature" centers on the notion that a life should be lived in obedience to rules which are laid out by God or are embedded in nature. The rivaling "vocabulary of self-determination" centers on the ideal of an autonomous life, designed freely by the person who has to live it. Both vocabularies are shown to be relatively powerless to steer the course of medical technology-development. Swierstra formulates some pragmatist suggestions to remedy the impotence of both vocabularies by taking into account their original contexts of invention, thereby opening up new avenues for communication between their proponents.

As is clear from this brief outline, *Pragmatist Ethics for a Technological Culture* contains a rich variety of issues and perspectives. In the epilogue, the editors lay bare some interesting connections between the various contributions. They elaborate on some common themes and further develop the thoughts and ideas that were presented in their first discussion paper (in the prologue to the volume), resulting in a systematic overview of the tasks and tools of a pragmatist ethics for a technological culture.

Comments on Pragmatist Ethics

In their comments on our volume on pragmatist ethics for a technological culture, Hans Radder, Vincent Colapietro and Joseph Pitt raise a lot of pertinent and intriguing questions, some of which we will try to answer in our reply at the end of this issue. In order to provide an overview of these questions I will end this introduction with a brief summary of their papers.

Pragmatism, Ethics, and Technology

In his essay "Pragmatism, Ethics, and Technology," Hans Radder offers some reflections on the three main concepts of the book: pragmatism, ethics and technology. Radder rejects the claim of some contributors to the volume that, together with foundationalism and scepticism, pragmatists should ban each and every form of universalism. But he is not at all satisfied with the specific proposals of universal criteria for scientific truth and moral rightness made by other contributors, notably Brian Norton and Paul Thompson. Radder then goes on to give his own account of universalism using three distinctions: between universalism and foundationalism, between the normative force and the factual

acceptance of claims of a universal scope, and finally between the general description of universal norms and the requirements of a particular case.

The second issue raised by Hans Radder concerns the pragmatist view on the relation between theory and practice. Radder contends that philosophical and ethical reflection can be found in many human practices and he criticizes pragmatism's one-sided view of human beings as exclusively practice-oriented.

Radder's third and last issue is about the ethical relevance of technology. Here Radder cautions against the editor's claim that technological artifacts possess a written-in or built-in normativity. This claim is misleading and may easily slide into the outdated doctrine of technological determinism. In general, Radder remarks, the authors of the volume have failed to provide an appropriate philosophical account of technology. And this is all the more unfortunate because a cogent "pragmatist ethics for a technological culture" needs such an account if it aspires to be theoretically convincing and practically useful.

The Pragmatic Turn

In his essay "The Pragmatic Turn," Vincent Calopietro touches upon a wide variety of topics but there clearly is a strong thematic thread running through his diverse comments: what the editors of the volume call "the reversal of the traditional relation between theory and practice." On this basic idea of pragmatism Calopietro"s view seems to differ from Hans Radder"s. While Radder criticizes this reversal because of the neglect of philosophical reflection, Calopietro, on the other hand, maintains that in turning toward our human practices, pragmatism does not drive away from the history of philosophy but rather takes up this history in another than an antiquarian manner. Pragmatism does not reduce theory to the handmaiden of practice, Calopietro claims, but rather conceives theory as itself a form of practice. What he has in mind is a *critical* turn towards the practices in which we are always already implicated. Part of the task of pragmatism is to refine our reflexive accounts of these practices and to correct possible distortions and deformations. To accomplish this critical task, Calopietro claims that we have to turn to philosophical resources outside the pragmatist tradition, especially to the European tradition of hermeneutic suspicion from Marx and Freud to Paul Ricoeur, Michel Foucault, Jacques Derrida, et cetera.

Calopietro ends his essay with a highly critical note on the ideal of "equal coexistence." The editor's put forward this ideal in order to achieve and maintain communication and cooperation across the lines that separate communities with different and even conflicting worldviews and moral convictions, i.e. in situations where possibilities of consensus or compromise are limited or absent. Colapietro takes this to be a distressingly unpragmatic conclusion to an otherwise consistently pragmatic book, because, for true pragmatists, he insists, the limits of compromise and consensus are only experimentally determinable.

Ethical Colonialism

In his essay "Ethical Colonialism," Joseph Pitt cautions against what he calls the editors' "ethical colonialism." Not unlike some environmental ethicists who accord moral status to rivers and mountains, the editors want to endow almost everything, including technological artifacts, with normativity. That is to say, Pitt shares Radder's view that the editors mistakenly claim that technological artifacts possess a written-in or built-in normativity. But he goes one step further in his critique and also objects to the "Latourian" idea that material things possess some kind of agency. In Pitt's account of a pragmatic ethics, normativity should be placed in people, especially in people making the relevant decisions, rather than in things and technologies.

This leads Pitt to his second issue: the pragmatist ideal of creative democracy. Here Pitt cautions against the editors' far too idealistic idea that the best way to generate the creativity that is needed to meet the ethical challenges of technological change is to have everyone at the table. According to Pitt, just bringing people to the table is simply not enough. Because technological change threatens a person's values and his or her perception of the good life, most people will refuse to engage in discussion. As an important way to overcome this fear of the unknown, Pitt mentions the use of metaphor. After all, the function of metaphor is generally to understand new and unknown things with the help of more familiar and well-known concepts. According to Pitt, there are two basic pragmatic maxims that can serve to find the right metaphor or metaphors to discus technological innovation. The first maxim is "consider the consequences," including the moral consequences; the second maxim is "the community is the ultimate arbiter."

In their reply, "Pragmatism in Progress," Jozef Keulartz, Michiel Korthals, Maartje Schermer, and Tsjalling Swierstra will use the opportunity provided by the commentators to further elucidate their pragmatist program.

References

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Pragmatism, Ethics, and Technology

Hans Radder
Free University of Amsterdam

Pragmatist Ethics for a Technological Culture presents a variety of essays on a significant and timely issue. The plan of the book is thoughtful. It comprises nine major chapters, each followed by a brief commentary. The volume is divided into four parts: technology and ethics, the status of pragmatism, pragmatism and practices, and discourse ethics and deliberative democracy. In addition, the introductory and concluding chapters by the editors help to connect the various contributions. Moreover, these chapters sketch an interesting programmatic approach for dealing with the ethical problems of our technological culture. The only complaint one might have about the book's composition is the lack of a subject and name index.

In this essay, I will not present the usual summary review but instead offer some reflections on the three main concepts of the book (pragmatism, ethics and technology) and on the way these concepts have been explained, employed and related in the various contributions. My overall conclusion is that, although much can be learned from the book, it also falls short in some respects. The most important problem is that, appearances notwithstanding, the full significance of technology for our ethical problems is not being appropriately acknowledged.

Pragmatism

Let me start with a preliminary issue. As do most of the authors, I think that it is appropriate to speak of a pragmatist, instead of a merely pragmatic, approach to ethics. As I see it, a pragmatist approach requires the commitment to engage in discursive explanation and argumentation, while a pragmatic approach suggests that these more theoretical activities may be omitted. That is to say, as academics, pragmatic people should be pragmatists.

Quite a few contributors address the questions of how to define pragmatism and whom to include as pragmatist philosophers and ethicists. The editors' intention is to describe pragmatism in a broad way. Hence, they sometimes speak of a pragmatist "spirit.". They name five characteristics of this spirit: anti-skepticism, anti-foundationalism, anti-dualism, the priority of practice over theory, and an experimental attitude (Keulatz, *et al.* 2002, pp. 14-15; pp. 250-251). In this and the following section, I will briefly comment on each of these characteristics.

Among philosophers living in the 21st century the rejection of foundationalism and skepticism—be it in epistemology or in moral theory—is quite common. Finding and substantiating an indubitable foundation for our knowledge, norms and values is usually deemed to be as impossible as systematically and universally doubting everything we believe or desire. In this sense, almost all of us are pragmatists.

Sometimes however, further claims are advocated under the banners of anti-foundationalism or anti-skepticism. Thus, Tsjalling Swierstra (p. 224) and Hans Harbers (p. 143) mention universalism and foundationalism in the same breath and accordingly claim that pragmatists should reject all forms of universalism. Not all contributors subscribe to this claim, however. Bryan Norton, for example, holds the evolutionary-pragmatist view that what will prevail (that is, survive) in the long run must be right, both epistemically and ethically (pp. 185-186). This view clearly expresses a universal criterion of truth and rightness. Paul Thompson, to mention another example, endorses the more sophisticated account of Peirce, who links truth to a universal but counterfactual consensus, and extends this to a similarly defined notion of normative rightness in the sense of Habermas' and Apel's discourse ethics (pp. 202-204).

I think that these specific proposals of universal criteria are highly problematic. They presuppose that both our knowledge and our ethics will converge, either factually in the long run or counterfactually under certain ideal conditions. The basic problem, however, is that there simply is no good reason to expect the emergence of such a convergence, however long we may continue our inquiry or however ideal our discourse might be organized.[1] In his commentary paper, Henk van den Belt reaches a similar conclusion regarding Norton's brand of pragmatism which is primarily based on the work of the older American pragmatists. Van den Belt rightly concludes that Norton "fails to come to terms...with a situation of persistent scientific disagreement...or irresolvable value pluralism" (p. 194).

The same point can also be phrased as follows. The volume as a whole presents a variety of philosophers as pragmatists. Next to the classical American pragmatists Peirce, James and Dewey, we find Wittgenstein, Neurath, Habermas, Foucault, Rorty, MacIntyre, and Latour. Now, the above criticism of universalist evolutionary and discourse pragmatism is quite compatible with, for instance, the views of Wittgenstein, Foucault, Rorty, MacIntyre or Latour. What this shows is

that it does not make much sense to lump together the substantive views of modernist, postmodernist, and amodernist philosophies under the banner of a united pragmatism.

In the next section, I will come back to the question of universalism for the case of ethics. Here I would like to say a few words about another characteristic of pragmatism, namely its anti-dualism. This anti-dualism involves an opposition to a variety of dichotomies (p. 15). I will discuss only one of these, namely the dichotomy between theory and practice (which is mentioned as a separate characteristic on p. 250).

Many contributors emphasize the primacy of practice. Pragmatism, they say, is primarily oriented toward the solution of practical problems and/or the clarification of practical matters. From this perspective, the older pragmatists—in particular, James and Dewey—declared that philosophical theorizing should always be subservient to practice. More recent views—the later Wittgenstein, Foucault and Latour—are even more radical in that they explicitly deny the significance of philosophical theories and explanations. Both positions, however, achieve much less than the promised resolution of the claimed dichotomy between theory and practice. The older pragmatists merely reverse the philosophical hierarchy between theory and practice, which can hardly count as resolving the dichotomy. The problem with the more radical claim that philosophical theories and explanations are practically insignificant is that this claim itself lacks practical support.

Here are some counter-examples to this claim. Practicing scientists often hold philosophical views which may influence their scientific research in decisive ways. Thus, the scientific work of such physicists as Maxwell, Boltzmann, Pauli and Heisenberg shows a substantial impact of their philosophical views about a variety of ontological, epistemological and methodological subjects (De Regt 1996). Furthermore, people involved in technology policy debates, for example on the risk of nuclear power, often prove to endorse specific philosophical views, for instance on the objectivity of risk analysis versus the subjectivity of risk perception (Radder 1996, ch. 6). Finally, lawsuits about patent controversies may include theoretical-philosophical debates, for instance about the distinction between scientific discovery and technological invention (Radder 2004). I trust that these illustrations from scientific, technological and legal practices can be easily supplemented with many examples from other practices, including moral practices. Hence, a pragmatist approach should neither dismiss theory altogether

nor subordinate it to "merely" practical affairs.

The root of this problem, however, goes more deeply. The problem arises from the one-sided view of human beings as exclusively practice-oriented and the complementary neglect of the reflective side of human life. In thinking about this issue, two things should be kept in mind. First, as we have seen, significant theoretical-philosophical reflection can be found in many human practices and not just in professional philosophy and ethics. Second, the value of theoretical-philosophical reflection is not necessarily limited to the practices for which it has been invented in the first place.[2] Hence, a more truthful and more fruitful view should acknowledge the fact that theory, even metaphysical theory, may play a meaningful role within practices, while its meaning cannot be reduced to the specific practices in which it has thus far played this role.

Ethics

In their introductory chapter, the editors describe the pragmatist approach to ethics in the following manner.

> Pragmatist ethics...does not represent a radical break with the current practice of ethics, but does imply a number of interconnected changes of emphasis: from epistemology to methodology, from product to process and, above all, from justification to discovery (Keulatz, *et al.* 2002, p. 20).

This careful phrasing is, I think, a plausible rendering of how pragmatist ethics is actually being practiced. Consider, for example, the experimental attitude to moral problems, itemized by the editors as one of the main characteristics of a pragmatist approach. This attitude involves a willingness to develop and try out novel, morally relevant concepts, vocabularies and practices. The introduction and articulation of the concept of a pre-embryo in debates on in vitro fertilization, described in chapter 2 of the book, and the exploratory practices of the adaptive management movement for a sustainable environment, discussed in chapter 9, exemplify this experimental approach.

I suppose, however, that also pragmatist ethicists will not find just every experiment that could be performed permissible, and that they will accept certain limitations on the experimental approach. Schermer and Keulartz, for example, advocate an experimental attitude with respect to reproductive technologies, but

apparently this attitude should not be extended to experiments that would imply the commodification of children (p. 58). Analogously, Norton promotes an experimental approach to environmental problems, but he also insists that the use of experimental science in environmental management should be embedded within a (participatory) democracy (pp. 187-188). Apparently, democratic decisons may designate certain experiments as allowable and others as not allowable. Thus, these examples illustrate the general point that the advocacy of an experimental approach to moral issues involves a change of emphasis and not a license for normatively unconstrained experimentation.

In the preceding section, I criticized two universal criteria of truth and rightness. However, contrary to some of the contributors, I do not think that pragmatists should a priori ban each and every form of universality. With respect to this subject, it is crucial to distinguish three different issues.

The first is whether pragmatist ethicists should always refrain from making (moral) claims of a universal scope. I think the answer to this question should be a clear 'no'. In fact, quite a few examples of moral claims that are universal in scope can be found in the book. Thus, Michiel Korthals asserts that all animals deserve serious (but not equal) moral consideration (p. 138). Furthermore, in their account of the ethics of in vitro fertilization, Maartje Schermer and Jozef Keulartz apparently assume that all lesbians should be eligible for IVF treatment (p. 59). Clearly, one may accept some universal claims without being committed to a form of foundationalism.[3]

A second issue bears upon the distinction between the normative force and the factual acceptance of a claim. Making a moral statement of universal scope is not the same as asserting that it is being universally accepted, let alone stating that all people always act in accordance with the statement. Thus, while the first of the universal claims in the preceding paragraph may be widely (but probably not universally) agreed upon, the second will be much more questionable. Nevertheless, the distinction between normativity and acceptance remains important for blocking the reduction of norms to facts.[4]

In the book, such a reduction is implicit in Hans Harbers' commentary paper on how human beings (should) relate to different kinds of farm animals. In a more explicit way, Bryan Norton attempts to explain the concept of sustainability in terms of the evolutionary notion of survival. What he fails to notice, however, is that the norm of sustainability cannot be derived from the facts of evolution.

After all, the history of evolution shows both survival and extinction of species. Since nature at large does not care about the latter, the history of evolution provides no reason at all why human beings *should* strive for a sustainable future.[5]

The third issue with respect to universality in ethics adds a very important qualification to the first two. The existence of moral norms does make a difference in practice. Yet such norms, even if they are of universal scope and universally accepted, do not independently fix what we should do in concrete circumstances. One reason for this is the gap between the general description of the norm and the requirements of a particular case. All animals may deserve some moral consideration, but this does not yet tell us what this concretely means for our relationship to a particular animal in a specific situation. Another important reason that constrains the practical application of norms is the reality of moral dilemmas. This tragic aspect of the human condition is rightly stressed by Korthals, who also provides some illustrations from the domain of human-animal relationships (pp. 128-130). Another illustration may be found in the IVF case. Even if everybody agrees that all lesbians should be eligible for IVF, in particular cases there may be countervailing reasons for not acting according to this norm, such as age or a pre-existing medical condition.

Technology

Let us now turn to the third main concept of the book. Unfortunately, the book is least convincing when it comes to analyzing the significance of technology for a pragmatist ethics. To be sure, the editors do criticize the "technology-blindness of ethics" and recommend technology as a subject of sustained ethical consideration in its own right (pp. 5-6). In the same vein, some of the commentators emphasize the ethical relevance of technology. Thus, Peter-Paul Verbeek points to the technologically mediated character of human experience and the ethical significance of this mediation (pp. 120-123). A similar point is made by Rein de Wilde. He opposes the idea that technology is external to ethics, and hence he recommends that pragmatist ethics should enter the world of making and shaping technologies (pp. 243-244). In spite of these correct observations, it is striking that none of the major chapters of the book includes a comprehensive and thorough philosophical account of technology or even a thick description of specific technologies.

In addition, what *is* being said about technology is not always adequate. Thus,

Larry Hickman follows Dewey in defining technology as the study of our tools, habits and techniques and in claiming that technology is good in the same sense that biology and geology are good. Each of those disciplines helps us to find out things that we need to know and to do things that we determine to be worth doing (p. 30). He adds that when things go wrong this is not due to a presumed intrinsic badness of technology as such but to bad—that is: specific, uninformed and/or immoral—human choices.

Such a definition and valuation of technology is problematic for a variety of reasons (see, e.g., Radder 1996, chs. 6 & 7). First, seeing technology as the *logos* of *techne* tends to separate the theoretical study of tools from the investigation of the particular contexts in which the technologies have to be materially and socially realized. Next, a conception of technology as consisting of separate tools underexposes the systemic character of technology. It ignores the fact that, in actual practice, the different "tool*s*" have to be coordinated and integrated within a technological system in order to function properly (cf. Hughes 1983). Furthermore, the plausible alternative to the dystopian assessment of technology as intrinsically bad (the target of Hickman's criticism) is not its valuation as intrinsically good, but rather the insight that it makes no sense to value technology "as such" independently of its contexts of realization. Finally, ethical analyses and evaluations should not be limited to technological failures (p. 31). Successfully realizing particular technologies requires specific transformations of the natural, personal and socio-cultural world in which the people involved will have to live. Hence, a mature ethics of technology should also address the quality and normative desirability of this world.

Taking account of technology is also important in assessing the issue of the private or public nature of moral stances. Swierstra is right in criticizing the "privatization" of substantive moral views advocated by liberal ethicists (pp. 238-239). His arguments can be made much stronger, though, if we include the insights, first, that in our technological culture ethics and technology are intrinsically related, and, second, that the successful realization of technologies is an irreducibly public, and never a merely private, matter. A straightforward example can be found in Gerard de Vries' contribution (p. 162). Predictive medicine not only confronts individual people with new choices (of using or not using a particular medical technology), but it also brings with it new public practices which cannot be 'chosen' by individual people. Thus, being for or against genetic screening is not only a matter of private ethical principles, when insurance companies are allowed to make the acceptance of clients dependent on

their willingness to take such tests.

I would like to conclude these remarks on the relationship between ethics and technology with a caveat. Pragmatists correctly (but also somewhat trivially) claim that new technologies may engender novel moral problems. They are also right in that we may sometimes resolve moral issues through technological means. All this does not, however, imply that technological artifacts, *by themselves*, carry a *specific* normative or political weight. The latter claim may easily slide into the doctrine of technological determinism, which has been convincingly criticized over the last decades (see, e.g., Wyatt 1998). Thus, even the statement that "technological artifacts possess a written-in or built-in normativity" (p. 9) may be misleading. Think away the human context or imagine a radically different context, and the specific normativity of particular artifacts (for example, of the female contraceptive pill) will disappear or change accordingly.

In sum, a cogent pragmatist ethics for a technological culture requires not just appropriate reflection on pragmatism and ethics. If it aspires to be theoretically convincing and practically useful, it needs an equally appropriate philosophical account of technology.

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[1] In Radder (1988, ch. 2) I have shown this in detail for the case of Habermas' discourse theory of truth. An additional drawback of the evolutionary-pragmatist view is that the notions of 'prevalence' and 'in the long run' are all too comfortably vague. Hence, in practice this view may lend itself too easily to a legitimization of the morally unacceptable idea that might is right.

[2] Cf. Swierstra's point of the transportability of moral vocabularies (Keularz 2002, pp. 225-227).

[3] The restriction to making universal *claims* is important, since attempts at justifying the universal validity of norms and values *per se* will unavoidably lead to foundationalism.

[4] For a sophisticated, non-reductionist account of the relationship between facts, norms and values, see Pels (2003, ch.4).

[5] For a more detailed criticism of evolutionary ethics, see Kirschenmann (2001, ch. 12).

The Pragmatic Turn: A Practical Turn Toward Human Practices In Their Irreducible Multiplicity

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This collection of essays and responses is predicated on the assumption "neither traditional philosophy nor current bioethics seem to possess a vocabulary" adequate to treating the issues confronting us today, issues resulting from the highly dynamic character of our modern technological culture (Keulartz *et al.* 2003, xvii). The detailed descriptions and analyses of the interplay of technology and culture, offered by science and technology studies, are (the editors inform us) crucial for crafting such a vocabulary. But the hostility of those engaged in these studies to ethics limits their value for addressing bioethical questions (xviii). In contrast, pragmatism "gives serious ethical consideration to the…normative implications" associated with "the co-evolution of technology and society" (xviii). But it has not tended to give the same painstaking, detailed accounts of our contemporary practices as have been given by Science and Technology Studies (STS). Thus, the interplay between pragmatism and STS is likely to be mutually beneficial.

There are twenty chapters in and as many contributors to this impressive volume. The contributors cover a wide range of topics, from a broad array of perspectives, perspectives representing not only diverse philosophical traditions but also different articulations of the same tradition (most notably, the philosophical tradition of American pragmatism). Echoes of the voices of Peirce, James, Dewey, and Mead can be heard in these pages alongside those of the voices of Foucault, Habermas, MacIntyre, and Latour.

A tendency cutting across the differences at which I have just hinted is that, regardless of philosophical orientation, the contributors offer principally programmatic statements, some of which revolve around taxonomies of pragmatism. Indeed, in the "Epilogue," the editors call attention to pragmatism's allegedly "split personality"—rationalist or prosaic pragmatism, on the one hand, and romantic or poetic pragmatism, on the other (p. 255).

The predominant pattern exhibited by the individual contributions tends to take this form. A program of research is *outlined*, often in broad strokes, and then *illustrated*, though, in most cases, only in a highly abridged manner. The point, character, and novelty of this program are brought into focus by contrasting this program with other historically influential ones or even merely possible alternatives. Herein is one of the main motives prompting the contributors to propose the various taxonomies encountered in this volume.

In "Ethics in a Technological Culture," the editors characterize pragmatism negatively. The identity of pragmatism is taken by them to be bound up with three "anti-theses, theses aimed against particular philosophical principles that form obstacles to the productive solution of problems and a satisfactory settlement of conflicts" (p. 14). These are anti-foundationalism, anti-dualism, and anti-skepticism. In their explication of anti-dualism, however, the editors immediately mention the rejection of essentialism on the part of pragmatisms, so this anti-thesis might be added to the other three rather than subsumed under one of them.

This essay draws to a conclusion by stressing the need to develop new moral vocabularies. These alone will enable us to twist free from traditional impasses, so often due to the rigid dichotomies enshrined in our traditional vocabularies (such categorical dualisms as person and thing, human and animal, male and female, culture and nature, human and machine). Hence, the editors suggest: "One of the main ways to move on from traditional dichotomies, which stand in the way of workable solutions to emergent problems, is to develop new vocabularies, in which speaking in terms of boundaries is replaced by speaking in terms of degrees" (p. 18; however see Thompson, p. 207).

As do most of the contributors to this volume, I tend to identify with the pragmatic tradition, but in my case it is mainly the tradition of Peirce, James, Dewey, Mead, and (to a lesser extent) Lewis, rather than Rorty, Putnam, and other more contemporary figures. Part of my attraction to this tradition is the potential of the texts at this tradition's center to re-orient philosophical discourse and, indeed, to re-make such discourse, as integral to the task of reconstructing our practices and institutions. Another part of my attraction is, often despite appearances, the antipathy of this tradition to reductionism. I take this to be such a central feature of pragmatism that I am disposed to add it to the list of anti-theses already discussed. Much is typically made of pragmatic deconstruction of traditional dualisms and unquestioned hierarchies, also of philosophical fixations

on apodictic certitude, too little however is made of the critiques of the various forms of reductionism put forth by first-generation pragmatists and their progeny. Richard Rorty's very early essay "Pragmatism, Categories, & Language" (1961) compellingly calls attention to this feature of pragmatism, even if its author thereafter rather quickly distances himself from Peirce and only eventually returns to pragmatism as a valuable resource for re-orienting philosophical discourse.

These points relate to the heart of the matter, the pragmatic meaning of pragmatism itself—what is practically involved in taking a truly practical turn toward our human practices (cf. Menand). The editors propose in their "Epilogue": "One of the things belonging to the hard core of the pragmatist research program is the reversal of the traditional relation between theory and practice, and the accompanying turn away from the prevailing philosophy, which has a strong fixation on epistemology" (p. 251). Though I have misgivings about framing this characterization in terms of the hard core of a research program (since it tends to encourage a scientistic and thus reductionistic understanding of pragmatism), there is much to recommend this formulation. Even so, we need to proceed carefully here. Pragmatism does not reduce theory to the handmaiden of practice, but rather conceives theory as itself a form of practice. If pragmatism pragmatically means anything, it heuristically means the self-conscious and self-critical turn toward the practices in which we are always already implicated and, as a consequence of this, by which we are defined (that is, by which we define ourselves in our transactions with other agents, human and otherwise). This turn toward our defining practices cannot help but be a turn toward our interwoven histories. It also cannot help but be a turn toward resources outside of pragmatism.

Though American philosophy includes far more than the pragmatic movement,[1] it is appropriate on the occasion to focus exclusively on this philosophical tradition. A philosophical or religious tradition is, as Alasdair MacIntyre suggests, an intergenerationally extended argument at the center of which is the question: What are we to make of this inheritance that has made us? Moreover, every tradition pivots around questions of identity. For instance, Judaism is an attempt to live the question, "What does it mean to be Jewish?" So, too, Christianity is an endeavor to live the question, "What does it mean to be Christian?" Analogously, philosophy is, in part, a series of responses to the challenge of ascertaining what it means to be a philosopher, though the insistently reflexive character of this question can, especially in an academic or

institutional setting, work toward rendering philosophy an ever more abstracted and insular meta-reflection on a distinctive genre of human reflection. The counterbalance to this tendency is the resolve to recollect that the question of what it means to be a philosopher is inseparable from that of how to live one's life and, thus, how to position oneself in a world of conflict and risk.[2] Temporality entails transience, just as loss and destruction impose the tasks of amelioration and reparation. In a world wherein everything is transient and precarious, also one wherein much lies in ruins and much else gives signs of decay and even implosion, the task of philosophers cannot be oriented principally to understanding their work; it must be ordained to protecting and repairing their world(s).

In "Transiency and Amelioration: Revisited," John J. McDermott suggests pragmatism is itself an attempt to plumb the deep significance of the term *practical*. How are we who today identify with this tradition (whatever misgivings we might have about the term by which it is identified[3]) to think through, in a truly practical manner, the deep significance of this seemingly trivial word?[4] How are we to translate even our most abstract theoretical terms and claims into concrete practical experiences and exertions? The resources of pragmatism are, however, not adequate for thinking through these and related questions, though these resources are invaluable. Thus, as aids in addressing questions regarding *praxis*, I turn to Karl Marx and Sigmund Freud as well as Peirce and James, to Jacques Derrida and Michel Foucault as well as Mead and Dewey, to Ludwig Wittgenstein, Maurice Merleau-Ponty, Hans-Georg Gadamer, Paul Ricoeur, Umberto Eco, and Paul Bourdieu as well as John Smith, John McDermott, Richard Bernstein, Richard Rorty, and Cornel West. Here I am simply imitating Smith (see, e.g., *Reason and God*), McDermott, Bernstein (e.g., *Praxis and Action*), and Rorty themselves. To treat the resources of pragmatism as adequate to address the question of practice[5] is, in effect, to betray the pluralism so central to this tradition. Peirce's careful study of the dusty folios of medieval authors and James' spirited engagement with his European contemporaries point to the need to look far and wide for help in addressing the questions at hand (see, e.g., Smith 1992, p. 196-99).

In particular, the genre of genealogy so imaginatively developed by Foucault is crucial for any truly pragmatic turn toward our historically evolved and evolving practices. In some important respects, Foucault is a better pragmatist than either Dewey or any other representative of American pragmatism.

This can perhaps be made plausible by considering Larry Hickman's "Pragmatic Resources for Biotechnology" and Hub Zwart's response to this essay ("Philosophical Tools and Technological Solutions"). Considering these two texts also provides us with an opportunity to consider one of the explicit desideratum of the four editors, a desideratum to which at least Hickman subscribes. Let me thus begin with a consideration of this by calling our attention to a curious feature of the exchange between Hickman and Zwart; and then let me suggest several respects in which Foucault is a better pragmatist than Dewey.

At the conclusion of his contribution, Hickman asserts: "If we take seriously the core claims of pragmatism, then we will begin to develop a new vocabulary to deal with issues involving technology" (p. 35). For him, this vocabulary will concern at least the terms in which we articulate the business of inquiry: "Deweyan style pragmatism issues a call to change the *way* we think about *how* we think" (ibid.). Such conceptual change cannot avoid being also a lexical change, a change in the way we discourse about thinking and, indeed, discourse itself (e.g., the translation of truth as "warranted assertibility" and also that of proposition in terms of the function of gathering data and facilitating inference, rather than bearing truth in any traditional sense [p. 29]). But, in the pages leading up to this conclusion, Hickman has tried to show the superiority *of* a vocabulary crafted by Dewey before 1940 *to* our contemporary lexicons.

So, too, at the conclusion of his response to Larry's essay, Zwart recalls Foucault's efforts in the history of sexuality to come to effective terms with the focal object of his philosophical interrogation. Zwart rightly stresses the experimental nature of Foucault's writings, noting in particular how the author of the *History of Sexuality* came to feel the need to replace "biopolitics" and "panoptism" (Foucault's favorite philosophical tools in the 1970s) with such expressions as "practices of freedom" and "technologies of the self" (p. 40). On Zwart's account (one I fully endorse), Foucault's inquiry forced him to revise the terms in which the process could be most usefully carried forward. Expressions crafted in other contexts and for other purposes tended to be eclipsed by ones designed specifically for dealing with the field of discursive and non-discursive practices in which Foucault had immersed himself as an inquirer.

There is a weak and a strong sense of "*new* vocabulary." In a weak sense, one does what Hickman and perhaps also Zwart in effect propose: one carries an antecedently established vocabulary into a new domain of discourse or inquiry.

In a stronger sense, one does what Dewey and, even more arrestingly, what Foucault does: one devises novel expressions to meet the emergent and thus unexpected demands of an ongoing investigation, acknowledging thereby the inadequacy of inherited vocabularies. Nothing comparable to Foucault's linguistic or lexical innovations is found in virtually any of the essays in this volume, perhaps because of the unstated and (in my judgment) unwarranted confidence in the terms crafted by the heroes of these contributors (Dewey, Foucault, Habermas, MacIntyre, or some other author). Zwart's characterization of Foucault certainly highlights the respects in which this contemporary French thinker might be counted among the pragmatists.

Though he mainly pays attention to Habermas rather than Foucault, Paul Thompson appears to endorse a manner of philosophical engagement quite close to Foucault's, though ironically somewhat at a distance from his own. At the outset of what is arguably the strongest essay in this volume, Thompson boldly states, "pragmatism is always occasional philosophy" (p. 200). He concludes with a qualification, but perhaps not an adequate one. This qualification comes at the end of a passage worth quoting at some length:

> The most important thing for a pragmatist to do is to actually participate in some practical moral discourse, rather than talking about the philosophical reasons for doing so. To participate in moral discourse is to talk philosophy on the occasions that present themselves. It is to diagnose the audience's problems and to tailor a philosophical response that speaks to it as directly as possible. Of course, it is valid and important occasionally to step back and situate that doing, that practice, within a philosophical tradition" (pp. 215-16).

This seems to me right as far as it goes, but it does not go as far as Thompson himself characteristically does in his own investigations. In accord with Thompson's own practice rather than his description of it, we must repeatedly step back from the immediate foreground of some practical engagement or some problematic situation, and then we must situate that engagement or situation itself in a thickly narrated history of the present. Moreover, we must view this engagement or situation in reference to formally elaborated frameworks having heuristic relevance far beyond any particular occasion.[6] This is just another way of stressing the extent to which the pragmatic turn is at once a historicist and a theoretical turn, a genealogical turn toward our enveloping practices making use of the resources from diverse traditions of theoretical reflection. Our task is not

simply to situate the practice under scrutiny within a philosophical tradition, but mainly to contextualize it within the complex interplay of the various factors constitutive of the historical present (including of course technological factors). Paul Thompson's theoretical description of his pragmatic engagement in occasional philosophy, especially concerning his distinctive manner of addressing normative questions, is (I submit) somewhat at odds with the scope and character of that engagement. It is far less occasional and more encompassingly historical and formally theoretical than this description conveys.

This is, however, more or less true of virtually all of our self-descriptions and self-depictions. Hence, part of the task of pragmatism is, in reference to any actual practice, to refine and correct the distortions and occlusions in our reflexive accounts. The European traditions of hermeneutic suspicion (especially psychoanalysis and Marxism) provide especially useful tools for carrying out this crucial task.

Related to this is Glenn McGee's claim regarding the role of experience in the context of inquiry and also Peter-Paul Verbeek's response to McGee's essay. McGee contends: "Knowledge is not grounded, for the pragmatists, by some pre-given reality apart from experience" (p. 109). The aim of his essay seems to be to show the need for recovering a pragmatically reconceived ground for our epistemic claims. Such a recovery involves a reconceptualization of experience in light of pragmatic and phenomenological accounts of our lived experience. According to McGee, we have to take seriously what in bioethics counts as "founded knowledge." There is indeed a danger in failing to do so. "The peril of ignoring the classical philosophical problem of the foundation of knowledge is," he insists, "great, at a minimum because … it puts those contemporary exponents of pragmatism at odds with the pragmatic philosophical tradition, which takes as its starting point the reconstruction of the quest for certainty" (p. 109). The dangers of clinging to the metaphor of foundations (hence, also to that of knowledge as an edifice) might be, however, as great or even greater than those of jettisoning these metaphors.

In his response to McGee, Verbeek suggests: "Humans never have a direct contact with reality; they cannot reach 'the things themselves'" (p. 120). *Direct* here means *immediate* and, in turn, *immediate* means *not mediated*. The claim being defended by Verbeek is that all of our experience *is* mediated, not only linguistically but also technologically. He calls attention to the work of Don Ihde

as a tool for exploring the technologically mediated character of our lived experience, especially in a technological culture such as our own.

My own position, derived from Dewey and even more from Peirce, is that our experience is at once direct and mediated. We have direct yet mediated encounters with the things themselves, things in their actuality and tenure apart from our whims and wishes, also potentially apart from the conceptual frameworks dominant at any particular time. In this context, the recognition of multilayered mediations (or what Peirce calls thirdness) does not entail the denial of brute otherness (what he calls secondness). Peirce claims, "we have *direct experience of things in themselves.* Nothing can be more completely false than that we experience only our own ideas. That is indeed without exaggeration the very epitome of *all* falsity" (1935, 6.95). He immediately adds: "Our knowledge of things in themselves is entirely *relative,* it is true [relative in various respects, relative to the range of our perceptual organs, etc.], but all experience and all knowledge is knowledge of that which is, independently of being represented" (ibid.) and in a sense even independent of the mode of representation and thus mediation (cf. Rosenthal; Colapietro).

My two final points regard mediation, but mediation in a more immediately practical and normative sense than the one just discussed. The first point can be sharply brought into focus by recalling a recent exchange between Giles Gunn and Louis Menand. In defense of the pragmatists against Menand's criticism that pragmatism cannot explain how humans acquire their wants and desires but only what outcomes might result if these wants and desires are enacted, Gunn suggests the direction in which we should look for the pragmatist's explanation. The charge that the pragmatists have nothing to say regarding how desires and wants are acquired in the course of experience is, in Gunn's judgment, "at least partially answered by pointing out that people's sense of desire is not unrelated to their sense of need, and James and Dewey expended a good deal of energy...pondering the significance that the second [our sense of need] might have for the first [our sense of desire]" (2002, p. 99). In his response to this attempt to defend the pragmatists against his criticism, Menand reframes the question in terms of "what we would call *mediated* desires" (p. 121; emphasis added). On this score, he insists, "compared to Nietzsche, Weber, Veblen, and Freud—not to mention the modernist artists and writers—the pragmatists relied on a relatively unsophisticated model of belief and action" (ibid.). That is, they paid insufficient attention to the complex processes by which even our seemingly most immediate desires (e.g., our desire for food or sex) are densely mediated affairs. On this

issue, I tend to side with Gunn against Menand, though I readily concede the pragmatists (especially in comparison with the figures mentioned by Menand) relied on a largely unarticulated model of desire. But an unarticulated model is one thing, an unsophisticated model is quite another. Consider, for example, the extent of Dewey's anti-Cartesian construal of mind in this passage from *The Public and Its Problems*:

> The idea of a natural individual in his isolation possessed of full-fledged wants, of energies to be expended according to his own volition, and of a ready-made faculty of forethought and prudent calculation is as a fiction in psychology as the doctrine of the individual in possession of antecedent political rights is one in politics. The liberalist school made much of desires, but to them desire was a conscious matter deliberately directed upon a known goal of pleasures. Desire and pleasure were both open and above-board affairs. The mind was seen as if always in the bright sunlight, having no hidden recesses, no unexplorable nooks, nothing underground. Its operations were like moves in a fair game of chess. They are in the open...Mind was 'consciousness'...[and, in turn, 'consciousness'] was a clear, transparent, self-revealing medium in which wants, efforts and purposes were exposed without distortion. (1988b, p. 299)

Such a view of wants and desires can hardly be called unsophisticated or uncritical, even if Dewey and the other pragmatists frequently failed to spell out in detail how the most "immediate" of our desires and wants are always mediated by factors of which we characteristically are *unconscious* in both the weak sense of unaware and the dynamic sense of strenuously ignoring.

What Dewey in *The Public and Its Problems* says about wants and desires he in *Experience and Nature* says about beliefs and attitudes. Experience

> is already overlaid and saturated with the products of the reflection of past generations and bygone ages. It is filled with interpretations, classifications, due to sophisticated thought, which have become incorporated into what seems to be fresh naïve empirical material...If we may for the moment call these material prejudices (even if they are true, as long as their source and authority is unknown), then philosophy is a critique of prejudices. (1988a, p. 40)

Contra Menand, this model of beliefs and attitudes is no more unsophisticated than the model of wants and desires put forth by Dewey in *The Public and Its Problems.* There is, thus, an explicit recognition of the mediated character of human beliefs and desires and, in accord with this recognition, a felt need for an ongoing critique of the largely invisible processes by which seemingly incontestable beliefs and innocent desires are generated. The ideal of political self-rule is impossible apart from that of moral self-rule and, in turn, the ideal of moral self-rule is impossible apart from psychological self-critique (part of the goal of such self-critique being making more transparent the mediated character of even our most firmly held beliefs and our most deeply characteristic desires).

The second point regarding mediation concerns the political rather than the psychological, though (as the passage from Dewey might be taken to suggest) the political and psychological are in actuality tightly interwoven. In their "Epilogue" to *Pragmatist Ethics for a Technological Culture*, the editors assert:

> An ethical consensus can exist only *within* a single community. In modern pluralistic societies, however, discussions take place primarily *between* different communities, which often hold competing views of the good life. In that situation ethical consensus is impossible, and because ethical convictions differ from negotiable interests a fair compromise is not suitable either; in ethical matters one cannot bargain nor make concessions without compromising oneself and one's integrity (2003, p. 262).

I take this to be a distressingly unpragmatic conclusion to an otherwise consistently pragmatic book.

One of the dualisms most needful of being broken down is that upon which the allegedly pragmatic ideal of "equal coexistence" is predicated. The limits of compromise and consensus are, *for pragmatism,* experimentally determinable. An unblinking recognition of plurality as a fact and an unwavering commitment to pluralism as an ideal do not necessitate ruling out (especially ruling out *a priori*) consensus *among* diverse historical communities or compromise with radically antagonistic regimes. The ideal of pluralism bids us to cultivate the moral imagination by which an ever more encompassing and less fragile consensus among warring cultures might be secured.

Moreover, the terms of coexistence cannot be defined in advance of the sites of and participants in the always multiple and often enduring conflicts concerning coexistence. It may or may not be on equal terms. The ideal of equality is certainly not one to be suspended lightly, but the contrite fallibilism of Charles Peirce encourages a readiness to make an act of contrition, a confession of *not* knowing in advance what the terms of our coexistence or even what the most ideal resolution of those problematic situations bearing upon possible coexistence would be. The resilient ingenuity of situated agents must continuously seize whatever cultural and technological opportunities are available to secure a global consensus regarding certain issues (e.g., the use of military arms, that of scarce resources, and the treatment of the ecosphere) and, inseparable from this task, to forge more equitable compromises than those presently in place. Such resilient ingenuity is nothing other than experimental intelligence, i.e., intelligence self-consciously committed to learning as quickly and deeply from experience as it can. For such intelligence, it is, at bottom, always a matter of looking and seeing (Wittgenstein), but after having tried and failed, most likely after having failed repeatedly.

Pragmatism is no panacea. It might not even be an *–ism.* The most pragmatism can do is to illuminate the conflicts, confusions, and crises in which our commitments and indeed successes implicate us. What is often most dissatisfying or disappointing about pragmatism is, in my judgment, most commendable and urgent – the insistence upon framing cultural conflicts in moral terms but the reluctance to proffer definitive solutions to these moral conflicts. This does not entail that *methodological* pragmatism is the most truly pragmatic (cf. Light). There is no locus outside of the practices, discourses, and institutions in which we live and move and have our being. The insistence upon the primacy, irreducibility, and authority of our practices does not solve any specific issue; it merely points us in the general direction in which any effective solution is likely to be found. Pragmatism is, as James and even Peirce often suggested, far more a sensibility than a doctrine, far more an orientation than a theory. It is a critical orientation toward our historically evolved and evolving practices. As such it drives in the direction of hermeneutics and genealogy, critique and celebration (p. 70). In turning toward our practices in all of their variety, pragmatism does not drive away from the history of philosophy or that of any other discipline, but rather takes up these histories in other than an antiquarian manner.

A pragmatist ethics in a technological culture will most appropriately take the form of a critical turn toward the various practices in which we are implicated, including those pertaining to bioethics. For such a task, the writings of Foucault, Habermas, Latour, and MacIntyre are as often as useful as those of Peirce, James, Dewey, and Mead. The ideal of creative democracy is, practically, one with the ideal of securing an ever wider consensus of warring parties on the basis of compromises in which the integrity of the parties making these is not felt by those parties to have been compromised.

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[1] There is often a double and even triple reduction—first, of American philosophy to pragmatism, then, of pragmatism to Dewey's instrumentalism and, finally, of Dewey's pragmatism to its "strong misreading" by Richard Rorty.

[2] "To be a philosopher is," as Henry David Thoreau notes in *Walden*, "not merely to have subtle thoughts, nor even to found a school, but so to love wisdom as to live according to its dictates, a life of simplicity, independence, magnanimity, and trust. It is to solve some of the problems of life, not only theoretically, but practically" (New American Library [1980], 14).

[3] One of the main points of John McDermott's essay was how unfortunate a label *pragmatism* is.

[4] In *Pragmatism,* James stresses the term is derived from a Greek word meaning "action, from which our words 'practice' and 'practical' come" (1975, p. 28). Max H. Fisch explains more fully the meaning of *pragma* when he identifies as its principal meanings "deed, action, behavior, practice, affair, pursuit, occupation, business, going concern." He goes on to note: "The Greek formula has several advantages over the Latin. The Latin *factum* emphasizes the completed actuality, the pastness, of the deed; the Greek *pragma* covers also an action still in course or not yet begun, and even a line of conduct that *would* be adopted under circumstances that may never arise. The Latin is retrospective; the Greek is, or may be, prospective. The Latin is, on the face of it, individual...The Greek leaves room for possibility and for generality..." (1986, 223-34).

[5] This is a misleading expression insofar as it suggests that there is a single question or problem, rather than a tangled cluster of issues.

[6] There might seem to be and, indeed, there might actually be a tension between my earlier point regarding the importance of crafting novel vocabularies and the recognition of frameworks having relevance across countless occasions for moral deliberation.

Ethical Colonialism

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The issue of finding an appropriate ethical system for this technological culture is an important one. The book that Jozef Keulartz, Michiel Korthals, Maartje Schermer and Tsjalling Swierstra have put together provides an excellent discussion of the need for a new vocabulary for ethics vis-à-vis technology, and they make a compelling case for pragmatism. That said, I have some concerns. I raise them in the spirit of continuing the exploration of the pragmatic ethics they have begun and not merely to be contentious. For some years I have been disaffected with the status of work in ethics—the little that I come in contact with, and I find the discussion in *Pragmatic Ethics for a Technological Culture* not merely promising but invigorating. My two concerns are: (1) over what I perceive to be a move towards ethical colonialism, and (2) the authors' conception of pragmatism.

At a conference held at Virginia Tech on the metaethics of moral value in March 2003, Sara Williams Holtzman gave a fascinating talk in which she wanted to accord mountains moral status. In the discussion that followed, I proposed that she was engaged in ethical imperialism. After reading *Pragmatic Ethics for a Technological Culture*, alas, I feel compelled to accuse Keulartz, Korthals, Schermer and Swierstra, of being unknowing allies of Holtzman and equally committed to ethical Imperialism, or more to the point, ethical colonialism.[1]

What do I mean by ethical colonialism? It is the attempt to endow everything in the world as an actor with moral value. It is to deny that there are other types of values, such as epistemic values, which have their own integrity and can operate in an ethical neutral framework. Consider this claim from the opening essay: "The example of the pill makes it clear that technological artifacts possess a written-in or built-in normativity. They embody particular options and restrictions, and thus reinforce or alter existing role divisions and power relationships" (p. 9).

There is a certain seductive allure to this Latourian idea that material things have a kind of agency. By virtue of their existence in our field of action, we are forced to accommodate artifacts and that, it is mistakenly claimed, gives them agency. I,

however, find it somewhat problematic to attribute agency to a tree simply because I have to walk around it.

The idea that technological artifacts possess normativity follows the same line of thought as Latourian material agency. That objects are to be used in a certain way, or come to be used in a certain way, however, does not mean they possess normativity. Nevertheless, the authors in their Introduction note that, "Technological artifacts carry a script or scenario within them; they require particular role patterns and role divisions and lay down a specific 'geography of responsibilities'" (p. xvii). Now, why is that the case?

The example they use to cash this idea out is the birth control pill—they point to the fact that it has given women control over their bodies and over when they will bear children—altering the power relation between men and women. They also point out the fact that the pill has facilitated the separation of reproduction from sexual activity, and its use has altered our perception of family planning. All of that is to the good—no objections from me here—but they neglect to mention that the pill was developed by a Catholic researcher for the express purpose of regularizing menstrual cycles of women who were having difficulty becoming pregnant because of irregular cycles. The point was to have more children, not fewer. If the pill embodies normativity, it is the norms of a tradition in a male dominated society. Now surely that is not the desired outcome of the example.

Let me try an alternative account, one that is not in conflict with the desired end of a pragmatic ethic, but one that places normativity in people, not in things. I do not object to the authors' claim that technological artifacts have normative significance. But the normative significance is a direct function of how people choose to view them and use them. It is the use to which artifacts are put that exhibits the normativity of the users, not the things. And this is a very pragmatic point of view. As I argued in *Thinking About Technology* (2000) in discussions of technologies, the emphasis should be on the decision-makers, not on the objects. Whatever normativity there is with respect to the designing, manufacturing and use of artifacts, is to be found in the values, both epistemic and non-epistemic, involved in making the decisions to do this rather than that, to use this material rather than that, and to use this tool rather than that. Decision-making is a value-

dominated activity. With respect to technological artifacts, whenever they are employed it is because a decision has been made to do so. Making decisions is an inherently value-laden activity since it always involves making a choice. Understanding the normative dimension of technological artifacts requires an analysis of the factors that played into the relevant *decision*s. If you want to understand the normative dimension of the birth control pill, ask a woman why she chose to use it. Ask the manufacturer why those materials rather than others—or why this shape for the dispenser rather than another. If I may be so bold, there is, therefore not one normative dimension to technological artifacts but many—and that in part is why there is so much discussion over technologies that promise the most. The more a technology promises, the more choices have to be made.

The insight that our authors are in risk of losing is that new technological artifacts open up possibilities for human action—which is what I think they mean by the "geography of responsibilities." The responsibilities, however, are not in the object, they are ours. For example, it is our collective responsibility to come up with a protocol or two regarding human cloning. It makes no sense to say the responsibility lies…where? in the process? But what is the process other than what people do? Somewhat in jest I propose to my students that now that human cloning is possible, not only will someone do it, but it also means that men are now facing extinction. Talk about changing the power relations!—if the only thing men are needed for is reproduction, then we are no longer needed. Given recent events, peace might have a better chance if men did not control the decision making process in our government. Women control the economy—they are smarter than we are and they live longer—we are done for.

To return to the issue at hand—the normativity of technological artifacts—it seems to me that by placing the normativity in the people making the decisions rather than in the technologies, we make the possibility of the authors' end-state, creative democracy, more attainable. Why do I think this? As I understand the authors' argument, it goes like this: (1) life in a technological world is dominated by change—therefore there can be no universal principles (I agree); (2) new technologies make for new possibilities for action (right again, especially since possibilities for action raise the specter of new moral problems); (3) the best way to decide what to do with new possibilities and new moral problems is to have as

many people as possible in the discussion (idealistic and probably not really a good idea because not everyone has something contributory to say on every issue); (4) new possibilities and new solutions require a new way of speaking—therefore we need creativity, and the best way to get that is to have everyone at the table (not clear).

As I see it, what makes change problematic is that change, especially technological change, threatens a person's perception of the good life and in so doing challenges his or her values. No one likes to have his or her values challenged. Our values are at the core of who we are—not all our values, but the basic ones, like, for example, protection for our children. If a proposed technological change, like locating a nuclear power plant next to my house, is perceived by me as a potential threat to my children, then you are right to expect me to object. And because there is little rational argument or rational deciding on our values, the possibility of rational discourse when there are clashes of values is very low unless something intervenes. Therefore, just bringing people to the table is not enough—it is not enough to get them to listen to one another and it is not enough to generate the kind of creativity needed for making decisions about the new possibilities and the nature of the new moral problems these possibilities bring. Several things are at issue here. The first concerns getting people to engage. The second concerns the meaning of "creativity".

Concerning getting people to listen to someone with a different point of view, this is a rock bottom problem; it permeates all peoples and societies. This is the same problem as understanding the possibilities a new technology offers—it is the problem of overcoming our fear of the unknown. Often people refuse to engage in discussion with someone who holds radically different views from theirs because they are afraid of the challenge the new ideas may pose to their own views, views for which they know they have no defense. That is, they are afraid of what they don't know or what they fear they may lose. Likewise, it is not so much that people object to technological innovation because of what they know about it—it is rather what they don't know that makes it so difficult to have a reasoned discussion. So I agree, something like creativity is called for—but I think we can be a bit more precise. If I am right and the problem is fear of the unknown, then what we need to do is to eliminate the fear by making the unknown more familiar, or, rather, to make the technology appear more familiar,

so that what it can do is not so threatening. I think the way to do this, to reduce the fear of the unknown, is to use metaphor. But, to see why this may work, we need to get a better handle on what we mean by "creativity".

Elsewhere I offer the following account of creativity: To be creative is to produce variation given the constraints of the materials and other parameters within which you engage in the deliberate design and manufacture of the means to manipulate the environment to meet humanity's changing needs and goals (Pitt forthcoming).

The problem in seeking creative solutions to ethical problems posed by technological innovation is in not knowing where to start. My suggestion is to start with the way we talk about our technologies and their possible ramifications. If we can come to a common language in which to discuss the problems, we may have a chance to actually finding solutions. But, unlike the positivists, I am not proposing that we develop a formal language from the start. Rather, I think we should circle the problems, trying out different ways of talking about it until we find one that satisfies all parties. The way to begin this process is through metaphor.

Metaphor, by its very nature, gives meaning to the new by way of associating it with something already understood. Irrespective of what Al Gore had to do with it, calling the world-wide web the information super highway was very helpful to many people in coming to grips with the potential for this new technology. It also helped to open up some of the ethical issues, like privacy. Calling it an "information" highway raises the red flag that should come up whenever issues of information are discussed. Further, because it is not just a case of potential eavesdropping, the manner in which this phrase serves as a metaphor becomes clearer. By using metaphor, however, we are not doing what our authors do not want us to do, which is to live in the past. The fact that we can rely on what is already understood, does not entail that we stop there. Metaphor extends the use of language, it changes the meaning of words, words that had a familiar meaning now mean even more. The material world is not the only thing that changes constantly—so does language—just try understanding a 16 year old today. But because it looks like the old language, we are often not aware of the extent to

which language changes—unless you are French and keep a careful watch over the purity of the mother tongue. But how do you say website in French?

The way to find the right metaphor or metaphors is by applying the pragmatic method. The pragmatist's first maxim is "consider the consequences". If we keep in mind the consequences of using this metaphor rather than that we can work our way toward a metaphor that captures what concerns us in terms of the consequences of allowing this new technology. For ethics, this does not reduce to mere consequentialism. The consequences the pragmatist considers are not just the effects of his or her actions; it is the effects of those actions on his or her knowledge base and on his or her values and goals. Translated, this says that in the evaluation of choosing A over B or C over D, there is more to consider than merely the physical consequences, there are also consequences for your vision of the good life, for the rock bottom values that constitute what you hold most dear, what you hope all people value. If you lie, what does that do to your self-image? If you use a gun to kill deer, what does that say about your conception of a civilized human being? If you use 5,000 pound bombs and withering machine gun fire to kill enemy soldiers and civilians alike for no clear reason, what does that say about the character of a country's leaders? What a pragmatist does is to consider the consequences and then using a feed-back loop return to his or her assumptions, values, knowledge, beliefs and readjust in the wake of what has transpired. Yes, it has a bit of relativism associated with it—but the second maxim of pragmatism helps to derail the slide to total relativism.

The second maxim is: the ultimate arbiter is the community. However you adjust your values, there are still the values of the community that override and with which the values of an individual must co-exist, and that must be considered as well. But what happens when the community fails, when the election process is subverted, when the leadership does not listen to its people? I don't know, but that is a problem for all, not exclusively for pragmatism.

So in closing, let me summarize:

- Technological artifacts do not contain values or normativity.
- Democracy will not solve all our problems because you have to get people to listen to others—not just talk at them.

- Using metaphor to demystify the new may help in getting people to actually communicate so they can talk reasonably about new technologies and old.
- Nevertheless, the two basic pragmatic maxims can serve as a basis for an evolving ethical system.
    1. Consider the consequences
    2. The community is the ultimate arbiter.

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[1] Andrew Garnar suggested the shift from "imperialism" to "colonialism". For he is correct in that the idea I am after is subjugation of new lands and the imposition of a new set of values for indigenous ones.

Pragmatism in Progress: A reply to Radder, Colapietro and Pitt.

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Hans Radder, Vincent Colapietro and Joseph Pitt have all raised interesting comments and concerns regarding the volume on pragmatist ethics. In our reply we will unfortunately not be able to address all of them equally extensive, but we will single out what we perceive to be the running threads through the comments.

The Double Movement of Pragmatism's Universalism

Hans Radder raises the issue of the status of universal norms, which allows us to give some more consideration to this issue. The pragmatist move against universalism is directed towards the widespread illness in philosophy to determine a priori, without factual inquiry, that some norms or criteria are universally valid. Pragmatism has two objections to this. The first concerns the fact that very often more important things are to be done in deliberating pressing ethical issues than to spell out and justify a priori valid norms through transcendental deductions or other non-empirical thought exercises. For example, paying serious attention to dilemmas at hand in order to discover promising approaches or possible answers to urgent ethical problems is often more fruitful than doing this a priori justification work. The second objection is that these non-empirical and non-experimental justification procedures are seen to be highly subjective and not very reliable.

From Plato onwards philosophers have been craving towards the universal by postulating some eternal truths and deriving from them some local rules that are to be upheld by commoners. Pragmatism is not against all forms of universalism; the universalism pragmatism is against is the universalism-from-above, that excludes serious discussion. It is also opposed to the kind of universal claims to validity that are not put forward as invitations to either agree and to live accordingly, or to come up with serious counter arguments (here Radders distinctions are very helpful). This leaves room for universal claims a posteriori, universalism-from-below, from human practices. It is therefore not inconsistent to argue that pragmatists are against a certain type of universalism and at the same time to uphold certain norms or criteria of

which it is claimed that they *are* underwritten by the practices involved or, different thing, *should be* underwritten. The first claim is then a deliberately empirical claim, based on investigation of all opinions on the issues covered by the norms. The second claim is a deliberately normative claim that invites all addressees to agree. The universalism-from-below does not imply the expectation that finally, somewhere, all practices will converge; it does not contain a utopian dream of a transcendental ideal of universal consensus, but the understanding that many practices do have similar norms and uphold similar values with respect to certain topics. Rawls' (1993) idea of an overlapping consensus across communalities belongs to this empirical universalism.

The universalism-from-below takes the shape of a double movement. The first movement starts with local practices and local principles and their locality transcending power. Ethical orientations are contextual, but not context–bound, and can have a generalizable meaning (Kettner 1998). In how far those locality-transcending transpositions (be it norms, technologies, or institutions) will acquire consensus or not is an interesting issue and depends inter alia on the fruitfulness of these local norms. The second movement starts with the emergent aspects of what could be called a common, although fragmented, moral orientation. If one takes into account that practices nowadays are becoming more and more interdependent, it happens that these practices do indeed share a common morality vis-à-vis certain hot ethical topics. This common morality is incorporated in international institutions like those of the UN and in international treaties. This common morality is gaining influence with respect to practices, cultures and countries that are still deliberating. For example, the International Treaty on Plant Genetic Resources for Food and Agriculture spells out conditions of ethically sound technological use of resources on the basis of the norm of intergenerational sustainability. This treaty has been signed by many nations and the remaining nations are under pressure to take a stance toward this treaty. Long debates and deliberations took place before this treaty was formulated, and in this process of discovery of a potentially universal norm, a priori dictates were out of place. Reservations against universalism-from-above should not make one blind for the many factual agreements there are already at hand with respect to human rights, environmental protection, technology and natural resources.

The Right and The Good

Let us unpack the implications of these translocations from a local level to a general level and vice versa, by referring to Habermas' distinction between a moral and an ethical discourse (Habermas 1991). In his comments,

Colapietro seems to suggest that it is not fruitful to distinguish between the moral question of "what is equally good for all" and the ethical question of "what is good for us" as members of a specific community.

The distinction between moral issues for all and ethical issues for a specific community appears to be clear and applicable enough, but the contrary is the case. This is probably what motivated Colapietro's critique. We would like to add that the distinction is too crude because a whole range of social collectivities exists between a particular group and the global moral community. However, instead of discarding this distinction altogether, we want to stress the importance of the context in which it is applied. In some cases it can be helpful, in others not; in some cases what is good for all is clear (such as 'do not kill', or 'do not lie'), in other usually more interesting and more urgent cases it is not. Take for example a question like: should we invest in genomics to improve crops or should we invest in traditional technologies? Or: should we use this and not that pre-implantation technology? It is a priori absolutely not clear which considerations are moral and which ones ethical, that is to say: which ones deserve general agreement (and to what extent), and which do not. Pragmatists like Dewey consider identifying and solving ethical dilemmas in connection with technology as a process of invention and reconstruction, and this applies also to the distinction between the moral and the ethical.

As a consequence, the double movement of transcending local communities by generalizing their ethical strategies to a meso or even global level (or vice versa) leaves it to be seen which solution in the end turns out to be something that deserves generalized or less generalized agreement. For example, several natural and social technologies are involved in managing scarce natural resources, but there are various management strategies with different ethical connotations. The strategy of self-management by stakeholders of nearly extinct natural resources like salmon in Scotland might not be transferable to the pacific where the same kind of fish are being threatened. Here, global agreement on the strategy is not necessary, only the recognition that different species of salmon are a valuable natural common heritage that deserves to be preserved for the next generations (as stated in the earlier mentioned FAO-treaty). Another example, food safety arrangements can have different ethical connotations, depending on the various contextual definitions of food safety. Here again, the management of food technologies cannot nor should always be generalized (Korthals 2004). In sum, it is an open question what the scope of a normative claim should be and what evidence can be brought forward in these different cases.

Consensus, compromise and coexistence

Calapietro also criticizes our ideal of 'equal coexistence' as distressingly unpragmatic. This conclusion seems to rest (at least partly) on the fact that his conception of 'consensus' differs significantly from ours. Colapietro apparently sees consensus and compromise as much the same thing. He claims that it cannot be ruled out a priori that consensus or compromise among diverse communities can be achieved in practice. "The limits of compromise and consensus are, *for pragmatism*, experimentally determinable" he says. We do agree with this experimental approach when it comes to determining where the empirical limits and possibilities for consensus and compromise lie.

However, we do want to hold on to an analytic distinction between consensus and compromise. Following Habermas, we understand rational *consensus* to be agreement on reasons for action, whereas a fair *compromise* is the agreement on a specific action without agreement on the reasons for action. Moreover, a compromise means that everyone involved makes concessions with regard to their interests. In other words, the difference between consensus and compromise is that between arguing and bargaining. From this definition it follows that the notions of a rationally motivated consensus and of an ethical pluralism between communities are mutually exclusive.

Second, given our pluralist condition, the core question of pragmatism, how to live and work together, is therefore an urgent one for which consensus is not always a feasible answer. Compromises, on the other hand, are not always suitable because on deep-seated value conflicts people find it hard to bargain and to make concessions without compromising themselves or their integrity. Where consensus or compromise are unattainable we have suggested that we should aspire to an "equal coexistence" of different ethical convictions.

We like to take this opportunity to elaborate a bit more on this ideal and on the ways to realise it. We want to do so by invoking the notion of 'boundary work', which has been developed in Science and Technology Studies (STS), and by connecting this notion with those of "frame restructuring" and "frame reflection" as developed within Public Policy Studies (PPS).

Boundary work

The tension between the heterogeneity of various actors and their viewpoints on the one hand and the necessity of cooperation and collective problem solving on the other can often be resolved through "boundary work." The term "boundary work" was launched in 1981 by Steven Woolgar, and further

developed by Thomas Gieryn in the context of the discussion on the demarcation of science and non-science. Gieryn studied how actors carve out a domain of cognitive authority for their discipline. He stressed the negotiated nature of what is considered science and what not. According to Gieryn the boundaries of science are fluid rather than fixed. His focus is on processes of differentiation, demarcation and distancing science from pseudo-science, ideology, or beliefs.

Susan Leigh Star has shifted the focus from competition over cognitive claims and cultural capital to cooperation across the lines that separate communities. The two approaches are complementary. Together, they illuminate what separates or integrates various groups with different moral convictions and worldviews, and what complicates or facilitates communication and cooperation between them.

On the basis of a case study of the historical development of the Museum of Vertebrate Zoology at the University of California, Star shows how heterogeneity and cooperation can coexist in the field of science. Scientific work is heterogeneous, requiring many different actors and viewpoints, but at the same time it also requires cooperation—"to create common understandings, to ensure reliability across domains and to gather information which retains its integrity across time, space and local contingencies" (Star & Griesemer 1989, p. 387).

In line with our pragmatist view, Star asserts that the tension between the heterogeneous nature of scientific work and its requirement for cooperation cannot be managed via a simple pluralism or a laissez-faire solution. Star introduces the notion of "boundary objects" to explain how people in practice handle both diversity and cooperation. Boundary objects are those objects that both inhabit several intersecting social worlds and satisfy the informational requirements of each of them.

> Boundary objects are objects that are both plastic enough to adapt to local needs and the constraints of the several parties employing them, yet robust enough to maintain a common identity across sites. They are weakly structured in common use, and become strongly structured in individual-site use. These objects may be abstract or concrete. They have different meanings in different social worlds but their structure is common enough to more than one world to make them recognizable, a means of translation. The creation and management of boundary objects is a key process in developing and maintaining coherence across intersecting social worlds (p. 393).

One of the most important features of the boundary object is that one group does not create or set the meaning of the object for other groups nor does one group regulate access to the object by other groups. "Boundary objects act as anchors or bridges, however temporary" (p. 414). They allow for equal coexistence without the necessity for consensus or compromise.

Metaphors as Boundary Objects

It is clear that boundary objects are quite divers. They not only include objects in the strict sense but also concepts, not only products but also processes and even people. An important type of boundary object is metaphor. Metaphors are mechanisms for understanding something in terms of something else. The conceptual function of metaphors is generally to understand complex, abstract or unstructured domains with the help of concepts from more familiar, concrete and well-known domains. But metaphors are not only important cognitive tools in making sense of the world but also in communicating about the world with others. This fits well with the comments of Joseph Pitt, who states that in seeking creative solutions to ethical problems posed by technological innovation, we have to start with the way we talk about our technologies. He claims that we need to come to a common language and the way to proceed is through metaphor. We agree with Pitt on the importance of metaphor and would like to point out that metaphors act like boundary objects. They are ambiguous and also flexible enough to allow for several uses and interpretations, both over time and across various topics, yet at the same time they are robust enough to maintain a basic set of conventional associations. Metaphors offer resonance between different social and temporal domains, they may serve as diplomatic devices that facilitate communication between different discourses and may function as tools of translation across the boundaries that separate different groups or communities (Hellsten 2002).

However, we do not agree with Pitt's statement that the way to find the right metaphor is by applying what he calls the pragmatist's first maxim: "consider the consequences." We believe that the test should rather be what we consider to be the first maxim: "facilitate cooperation and cohabitation."

In further elaborating this facilitating role of metaphor we can benefit from the work of pragmatist Donald Schön. According to him the difficulties in handling intractable social and moral controversies have more to do with problem setting than with problem solving, "more to do with ways in which we frame the purposes to be achieved than with the selection of optimal means for achieving them" (Schön 1979, p. 255).

According to Schön, problem settings are mediated by the stories in which people tell what is wrong and what needs fixing in a troublesome situation. When we examine these problem-setting stories, it becomes apparent that the framing of problems often depends upon metaphors underlying the stories which generate problem setting and set the directions of problem solving. Metaphors enable us—generally automatically and unconsciously—to make a "normative leap" from data to recommendations, from fact to values, from "is" to "ought." Schön gives the example of a slum that could be framed as a disease (that must be cured) or as a natural community (which must be protected or restored). Once we can see the problematic situation in terms of a normative dualism such as health/disease or nature/artifice, we shall know in what direction to move. It is the metaphor articulating the frame that carries over the logic from "is" to "ought."

As a pragmatist, Schön is interested in the creative and constructive resolution of policy controversies, generated by different and conflicting metaphors. Such controversies seem intractable; they are often not resolvable by recourse to facts and unlikely to be settled by compromise. They require what Schön calls "*frame restructuring*." Hereby "we respond to frame conflict by constructing a new problem-setting story, one in which we attempt to integrate conflicting frames by including features and relations drawn from earlier stories" (p. 270).

A necessary condition for frame restructuring, i.e. the recasting and reconnecting of things and relations in the perceptual and social field, is *frame reflection*. This requires what Schön and Rein have called "double vision": "the ability to act from a frame while cultivating awareness of alternative frames" (Schön & Rein 1994, p. 207).

This notion of double vision expresses exactly the kind of attitude that is required for the pragmatist ideal of equal coexistence. As we noted in our volume: "The conflicting parties have to appreciate the fact that they are competing for primacy within the same universe of discourse with others who cannot beforehand be branded as unreasonable. Such reflexive awareness rejects the naivety of dogmatic beliefs, recognizes its own fallibility and leaves room for 'reasonable dissensus'" (Keulartz *et al*. 2002, p. 262).

Moral Agency?

Both Radder and Pitt have commented on the editors' claim that technological artifacts possess a written-in or built-in normativity. While Radder beliefs this claim to be misleading, when it does not take into account the context, Pitt beliefs it to be utterly wrong. Pitt's remarks on ethical

colonialism—"the attempt to endow everything in the world as an actor with moral value"—are certainly astute. They provide a sharp warning against trendy but sloppy philosophizing. And we could not agree more with him that things are not moral actors like humans are, and do not possess moral value like humans and other sentient animals possess. Nowhere in the book do we suggest that things have moral value because they are moral actors. Moreover, as we will show further on, we share his opinion that not everything is or should be moral; there are other important values as well. However, we do belief that it is useful to speak of artifacts as (possible) moral agents. Not for ontological reasons, but for *pragmatist* ones.

Different ways of describing the relations between humans, technological artifacts and ethics highlight different elements of technological culture, and obscure others. Pitt squarely "places normativity in people." Normativity rests exclusively on human values and the choices we base thereupon. In his vision, there is no room for any agency of things. Pitt's concern seems to be that by ascribing normativity to artifacts we conflate categories. This in turn can easily lead to downgrading humans to the level of things, or upgrading things to the level of humans. The former is humiliating and dangerous—as has been made abundantly clear by the atrocities of the previous century. The latter is merely silly, like when the ancient Persian king Darius had the sea flogged because it had devoured his war fleet.

We share Pitt's implicit (and Kant's explicit) concern that one should not treat humans as things. But we do not think that it is by definition silly to describe the influence of things in terms usually preserved for human agents. Indeed, we think this a prerequisite for developing a vision in which normativity is co-created by humans and non-humans. Or to phrase this differently: in which normativity is a characteristic of the network, not of choosing individuals. A vision, we believe, that is even implied in Pitt's own comments.

We presented the birth control pill as an example of an artifact as moral actor. Pitt points out that a) the pill was developed with traditional Catholic values in mind[1] and b) that it had completely different consequences. For him this proves that artifacts do not possess a normativity of their own. For us it does prove exactly that. The gap between designer intentions and realized consequences provides a strong argument to talk of artifacts as possessing an agency of their own. We can even bow here to Pitt's first maxim of pragmatism ("consider the consequences"), which he himself seems to forget when he equates the normativity of the pill—if any—with the intentions of its designer. For Pitt these intentions were thwarted by the conflicting intentions of the users—the women in this case. We, on the other hand, feel that it is

reasonable to say that these user-intentions in their turn were partly shaped by the artifact itself. Once the pill existed, it created new possibilities that changed women's (and in the end, men's) expectations of life, relationships, parenthood, work, and so forth. Pitt himself acknowledges that artifacts can influence our values and choices when he speaks of technological change as threatening our conceptions of the good life, our most fundamental values. Now, how to threaten without being an actor in a certain sense?

Co-evolution

Technological artifacts possess a robustness, inertia and/or "uncontrollability" that makes that they do not quietly conform to the choices of their designers or users. They can even shape these choices. After a while it becomes impossible to determine who or what shaped what or whom first. Our human fates, including our morals, have become deeply entwined with the fates of non-humans. Sometimes we draw a sharp line between the two. After all, there is quite a relevant difference between hitting a nail or a neighbor. At other times softening the distinction opens our eyes for the intricacies of living in a technological culture where technology and culture co-evolve. Technological development is in part the result of technological, epistemic values, partly of cultural—including moral—values. And the same has become true of moral development. Humans do not choose or value in a technological vacuum. In our technological culture morality is co-produced by humans and non-humans.

A possible task for pragmatist ethics is studying this co-production, in the hope of enlarging our ability to "manage" it. There are many different modalities of co-production. In the most clear-cut case, artifacts can force us to (not) perform certain actions, leaving us little or no choice. The speed bump in the road forces me to drive at a safe speed. We have delegated part of our morals to artifacts. But the same bump hinders the ambulance on its way to an injured child. In this unintended consequence the "robustness" of the artifact, its own agency, becomes manifest. It is interesting to note that in the case of "forced actions" artifacts operate directly, with little or no symbolic mediation. My car can be more or less environment-friendly without me knowing anything about it. The result is a *decrease* of moral deliberation: driving safely becomes a matter of routine or necessity, independent of any explicit moral intentions or choices on the side of the driver (Achterhuis 1995, pp. 204-222).

Artifacts forcing us to do the right thing are relatively rare. More often they provide us with new possibilities—usually closing off a few existing ones in the process. These possibilities do not simply enlarge our freedom, they also

kiss to life dormant obligations and responsibilities by supplying the "cans" to "oughts" we had scarcely realized existed. In this sense, it can be argued—opposite to what we said above—that technology increases the room and need for moral deliberation. An example would be the way in which the technical possibility for organ transplantation has created a whole new responsibility, and according to some even a moral duty, to donate ones organs.

Furthermore, artifacts open up new worlds by changing or enlarging the ways we perceive ourselves, our fellow humans and the objects around us (Verbeek 2000). Think about the telescope that made us realize how infinitely small we are, or about the television that sometime creates solidarity between humans who never met each other in person, or the cars and trains that completely changed our relationship to the environment—now speeding by. Sometimes these technologically induced changes in perception have relevant moral consequences and sometimes they do not.

Are we now falling into the trap of ethical colonialism, attributing moral agency to all artifacts? We believe not. We already saw that technology can lead as easily to more morality as to less. But there is a more pragmatist reason. Often the influence of artifacts is trivial, e.g. when Joseph Pitt has to change course because a tree is in his way. Sometimes it isn't, e.g. when a fence directs him to a gate where officials are waiting to photograph him and take his fingerprints. In the first case it makes no sense to talk about the moral agency of things, in the second case it does. Not because the tree and the fence *act* differently, but because they *interact* differently with *our* values. It all depends on the context—in this respect we fully agree with Radder. In the end it is us who decide when a thing makes *relevant* changes in our behavior or values. We decide when artifacts are moral actors.

We thank our commentators for giving us an incentive to further develop our thoughts on the relevance of pragmatist ethics for a technological culture. We realize that we failed to supply convincing answers to all the questions they raised, but we hope we have at least clarified a few points. We understand our proposal for a pragmatist ethics as a research program (Schermer & Keulartz 2003), which we expect will have the heuristic power to generate the new ideas and fresh insights that are needed to accommodate our moral convictions and technological inventions.

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[1] As a historical anecdote we can add that in the Netherlands the pill was originally manufactured in the Catholic south and was packed by nuns.

Man and Machine in the 1960s[1]

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"Remember your humanity and forget the rest."
(From the invitation to the first Pugwash Conference, 1957)

Introduction

In 1960, the father of cybernetics Norbert Wiener published a short article titled "Some Moral and Technical Consequences of Automation" in *Science*. Wiener distinguished here between industrial machines in the time of Samuel Butler (1835-1902, the author of the novel on the dominance of humans by machines, *Erehwon*) and intelligent machines of his time. Machines circa 1960 had become very effective and even dangerous, Wiener stated, since they possessed "a certain degree of thinking and communication" and transcended the limitations of their designers. Describing in detail game-playing and learning machines, he contemplated a hypothetical situation in which such cybernetic machines were programmed to push a button in a "push-button" nuclear war. Simply by following the programmed rules of the game, Wiener warned, these machines would probably do anything to win a nominal victory even at the cost of human survival. Since machines became so fast, smart, and irrevocable, humans, unlike humans in the industrial age, "may not know, until too late, when to turn it off." The fictional dominance of humans by machines, which Butler had worried about and vividly depicted in his *Ehehwon*, had been transformed into a reality (Wiener 1960, 1355-1358).

Wiener's essay symbolized the beginning of a new conception of the man-machine relationship in the 1960s. The sixties witnessed the Cuban missile crisis, the Apollo Project, the counter-culture movement, Vietnam and student protests, political assassinations, the civil-rights and feminist movement, the publication of Rachel Carson's *Silent Spring* (1962) and the beginning of the environmental movement. To some the sixties was a Golden Age or "mini-renaissance"; to others it was the age of the disintegration of traditional values.

The sixties was also an age of new science and technology, for which people

had high hopes, as well as deepest fears. "Quarks. Quasars. Lasers. Apollo. Heart transplants. Computers. Nylon. Color TV. Pampers. The Pill. LSD. Napalm. DDT. Thalidomide. Mutual Assured Destruction. *Star Trek*. *Dr. Strangelove*. The Sixties had them all" (Moy 2001, p. 305). In molecular genetics, the structure and the function of RNA and the mechanism of genetic coding were discovered. In technology, satellite communication became popular, and man landed on the moon in 1969. The introduction of contraceptive pills in the early 1960s helped trigger the sexual revolution, and progress in other medical technologies—the synthesis of insulin, new vaccines, and transplantation of organs (tissue, kidney, heart, lung and larynx)—were notable. Electrical technologies such as color TVs and music players, as well as computers, became more popular. Some technologies, however, were tightly linked to war. Dwight Eisenhower explicitly warned in his farewell address in January 1961 about the dangers of the "military-industrial complex." The "electronic battlefield" introduced by the US government during the Vietnam War simulated enemy movement electronically. The rapid stockpiling of hydrogen bombs heightened fears of total annihilation (Mendelsohn 1994). Criticizing "man-made pollutants that threaten to destroy life on this earth," Rachel Carson's *Silent Spring* compares nuclear fallout to pesticides like DDT, which was itself a product of America's "total war against human and insect enemies" during WWII. Films such as *Fail-Safe* (1964), *Dr. Strangelove* (1964), *2001: A Space Odyssey* (1968), and *Colossus* (1970) depicted frightening relationships between humans and new technologies such as the control box of the nuclear bombers (fail-safe box), the Doomsday Machine, and intelligent computers.[2]

This paper will discuss new conceptions and ideas about the relationship between man and machine that emerged in the 1960s. Although the domination of humans by machines has always been a feature of critical commentaries on technologies, the relationship between man and machines in the 1960s had some unique features. Automation with cybernetic and flexible machines, which had begun in the 1950s, created widespread concerns and debates in the 1960s. Cybernetics, systems theory, and intelligent computers blurred the strict boundary between machine and organism, forcing people to rethink the nature of human intelligence and understanding. Machine and technology became part of what it meant to be a human. However, man-made machines—chemical pollutants and defoliants, the electronic battlefield, and the hydrogen bomb in particular—began to threaten the very existence of humans. In this paradoxical and uncertain context, an alternative essence of humanity was sought to save humans from the threat of automation and total annihilation. I will show that the heart of humanity shifted from the realm of intelligence to that of emotions and feelings.

Cybernetics, Mumford and the "Megamachine"

According to Norbert Wiener's cybernetics, there was no essential difference between man's intentional movements and a torpedo-in-motion that follows its target. Both could be explained in terms of control by the feedback of information.[3] In the 1960s, cybernetic ideas became more popular for several reasons. First, Wiener's popular book, *God and Golem*, was widely read and reviewed. The book outlined some provocative implications of cybernetics for religion, including one that as humans made a learning (cybernetic) machine, they became equivalent to God. Second, from the late 1950s, second-wave cybernetics was proposed by Heinz von Foerster. Second-wave cybernetics developed a reflexive aspect by including the observer into the system, and it was later extended into the theory of the self-organizing system. Several symposiums were held in the late 1950s and 1960s on the self-organizing cybernetic system (Wiener 1964).[4] Third, Mansfield Clynes and Nathan Kline, who worked for the American space program, coined the term "cyborg" in 1960. It stood for a "*cyb*ernetic *org*anism," a hybrid system of both artifact and organism. They considered that it could give man a freedom "to explore, to create, to think, and to feel" in a highly mechanized environment like a spaceship. Before long, cyborg became a very popular term. Alvin Toffler's *Future Shock*, published in 1970, had a section entitled "The Cyborgs Among Us."[5]

The idea of the cyborg captured the attention and imagination of the public in the 1960s largely because it was proposed at a time of intense concerns over automation. Mechanization began in the Industrial Revolution, when workers were called a "factory hand," or a part of the machine. Andrew Ure and Charles Babbage were well known to be ardent supporters of factory mechanization (Babbage 1963, p. 54). However, the mechanization that began with the Industrial Revolution was considered in the 1960s to be only the first stage of automation, that is, the stage of dependent machines. The second stage—the stage of semi-automatic machines—began in the early twentieth century. In the 1950s, the third stage of full automation with computerized automatic machinery and cybernetic devices was initiated at an accelerated speed. For example, throughout the US, only seven general-purpose digital machines were used in manufacturing in 1951, but within ten years, the number of the machines had increased to 7,500. Numerically controlled (NC) machines had been well developed, and were widely used from the aerospace industry to offices. In the mid-1960s, computers were used in the electric-power industry, cement companies, natural and artificial materials industries, automotive industries, food processing, and papermaking

companies. Automation was even applied to the post office and supermarkets. However, the impact of automation upon society was not yet certain. There was as much optimism as pessimism among the concerned. Optimists argued that automation would "ensure future technological progress, increase productivity and ease the strain on workers" by freeing them from drudgery and monotonous labor.[6] Pessimists and critics, on the other hand, argued that automation would replace workers with machines, increase the number of the unemployed, and transform the remaining workers into part of the machinery. It was the machine's logic, not human needs, that dictated automation. As one commentator put it, "automation not only frees human operators from routine work; it also frees the machinery from the restrictions imposed on it by man's limitations" (Santesmases 1961, p. 111).

The criticism directed towards the automated factory was extended to technological society and technical rationality in general. The psychoanalyst Erich Fromm deplored the notion that the ideal man for modern capitalist society was an "automation, the alienated man" (Fromm 1965/6, p. 31). Jacques Ellul's *Technological Society*, first published in French in 1954 and translated into English in 1965, blamed modern technology for emphasizing technological efficiency over humane values. Throughout the book, he emphasized the loss of human autonomy due to automated machinery: "The combination of man and technics is a happy one only if man has no responsibility; ... technique prevail over the human being ... Human caprice crumbles before this necessity; *there can be no human autonomy in the face of technical autonomy*" (Ellul 1964, p. 136-38). The American sociologist C. Wright Mills also characterized individuals in mass society as "cheerful robots" (Mills 1959, chap. 9, sec. 3). Herbert Marcuse, in his widely read *One Dimensional Man*, criticized technological rationality as a form of control and domination (Marcuse 1964).[7]

Lewis Mumford was an influential critic. In his short article published in *Technology and Culture* in 1964, "Authoritarian and Democratic Technics," Mumford divided technics into two types: authoritarian technics, which is system-centered and seeks for uniformity and standardization; and democratic technics, which is human-centered and values variety and ecological complexity. Criticizing the inventors of nuclear bombs and computers as "pyramid builders of our own age," Mumford pointed out that "through mechanization, automation, cybernetic direction, this authoritarian technics has at last successfully overcome its most serious weakness." Its most serious weakness was nothing but "its original dependence upon resistant and sometimes actively disobedient" humans. Mumford reasoned that the more technology becomes system-centered, the more it becomes autonomous or

alive escaping from human control, even from the control of "technical and managerial elites." Authoritarian technics was a "megatechnics" or "megamachine" which had both technoscientific and bureaucratic apparatuses (Mumford 1964, p. 1; p.5).[8]

The alternative to the megamachine lay in injecting "the rejected parts of human personality" into science and technology. "We cut the whole system back to a point at which it will permit human alternatives, human interventions, and human destinations for entirely different purposes from those of the system itself" (p. 7-8). Men must be disobedient: Be a Thoreau rather than a Marx. To support his argument on the significance of human elements, Mumford described two interesting episodes. The first was the huge electric power failure in the northeast US in 1965. Mumford had cited a magazine article which reported that the electric failure turned the entire city of New York dark and dead, but suddenly "the people [in New York] were more alive than ever." The second episode was the experience of US astronaut John Glenn. His spaceship was programmed to control itself automatically, but when its automatic control began to malfunction, John Glenn insisted on controlling it manually by sending to the earth a message, "Let man take over!" It is the message that Mumford wanted to propagate (1970, p. 412).[9]

Mumford was the founding member and leading figure of the Regional Planning Association of America. It advocated the idea of a "garden city," for which harnessing technology for the common good, as well as the revival of an "organic balance," were crucial (Wojtowicz 1996, p. 1-3). Mumford's humanistic, ecological vision, however, collapsed in the 1960s, since, as technology became autonomous, humans lost autonomy and became mechanized. "Instead of functioning actively as an autonomous personality, man will become a passive, purposeless machine-conditioned animal" (Smith 1994, p. 29).

His pessimism was shared by many. The economist John Kenneth Galbraith wrote (in *The New Industrial State*) that "we are becoming the servants...of the machine we have created to serve us" (Winner 1977, p. 14). René Dubos, a famous microbiologist, also remarked that "technology cannot theoretically escape from human control, but in practice it is proceeding on an essentially independent course" (Ibid.). The relationship between master and slave was reversed. One commentator asked: "Will the human be slave to machine, performing machine-required drudgery, or will he be master of a tireless, efficient slave?" (Meng 1968, p. 417) To pessimists such as Mumford and Ellul, men were no longer the masters of technology. This theme was vividly

expressed in the movie *Colossus: The Forbin Project* (1970). Here, the US scientist Dr. Forbin constructs an intelligent computer, Colossus, but once constructed, it rapidly becomes intelligent, manifests an independent intelligence, gets out of control, take over the world and enslave humans. Technology out of control was also a theme in *2001: A Space Odyssey* (1968). Isaac Asimov had introduced the famous "three laws of robotics" in 1942, the first of which was that "a robot may not injure human beings." Asimov's fictional fear had now become real to Mumford and others in the 1960s.[10]

A long time ago, some thinkers had already felt that men had become a "hand" of the mechanical system. In "Signs of the Times" (1829), Thomas Carlyle stated that "men are grown mechanical in head and heart, as well as in hand." Andrew Ure's *Philosophy of Manufactures* (1835) described the factory as a "vast automation, composed of various mechanical and intellectual organs, acting in uninterrupted concert for the production of common object, all of them being subordinated to a self-regulated moving force" (Mazlish 1993). Karl Marx also noted that "an organized system of machines, to which motion is communicated by the transmitting mechanism from a central automaton, is the most developed form of production by machinery. Here we have, in the place of the isolated machine, a mechanical monster whose body fills whole factories, and whose demon powers, at first veiled under the slow and measured motions of his giant limbs, at length breaks out into the fast and furious whirl of his countless working organs" (Channel 1991, p. 85).

Mumford's megamachine was, however, different from mechanization during the Industrial Revolution. It was much more than an automated machine or a mechanized factory. The megamachine was technocracy plus bureaucracy, with its own methods, philosophy and religion. It was essentially uncontrollable and invincible. Mumford had not been as pessimistic in *Technics and Civilization* in 1934, where he insisted that we should absorb "the lessons of objectivity, impersonality, neutrality, [and] the lessons of the mechanical realm" (1934, p. 363). But after having witnessed "mechanization, automation, [and] cybernetic direction" (Mumford 1964, p. 5) endowing authoritarian technics with immense power, Mumford had become pessimistic and critical. The reason for Mumford's change had to do with the emerging paradigm of "cyberscience."

"Cyberscience" and Blurring the Man-Machine Boundary

Several historians of science and technology have recently noted that some

new branches of science and engineering reinforced each other in the 1950s and 1960s, creating a powerful "discourse of information." The impact of this discourse was most apparent in molecular biology and genetics. Marshall Nirenberg, one of the scientists who successfully solved the problem of genetic coding, predicted in 1966 that man will be able to "*program* his own cells with synthetic information" (1967, p. 633) in the near future. In 1970, the Nobel laureate François Jacob proudly announced that "heredity is described today in terms of information, message, and code" (1974, p. 1) and that "the program [of modern biology] is a model borrowed from electronic computers; it equates the genetic material of an egg with the magnetic tape of a computer" (p. 9). This blurred the boundary between man and machine, said Jacob. Now, "the machine can be described in terms of anatomy and physiology" as much as "organs, cells and molecules are united by a communication network" (pp. 253-54) that made possible exchanges of signals and messages.

Jacob's novel description reflected the transformations of molecular biology in the 1950s and 1960s. The historian of science Lily Kay discussed the combined influence of Wiener's cybernetics, Claude Shannon's information theory, and John von Neumann's automata upon molecular biology. Shannon's definition of information as negative entropy was stripped of its semantic values (i.e., its meanings) in ordinary languages, leaving only its technical (i.e., syntactic) values. Information was thus a metaphor, Kay argued, and an information discourse in molecular biology functioned as a "metaphor of metaphor" which transformed the human genome into a sort of text "without a referent" (Kay 1997, p. 28). Evelyn Fox Keller disagreed with Lily Kay about the extent to which these new sciences affected molecular biology. Keller argued that the traffic of information from information theory and cybernetics to molecular biology was almost useless due to differences between genetic information and information defined as negative entropy. But Keller also acknowledged the importance of "cyberscience"—information theory, cybernetics, systems analysis, operations research, and computer science—for providing new metaphors such as information, message, coding, and feedback to molecular biologists. Computers, rather than clocks and steam engines, had become the new model for the organism (Keller 1994).

In the same vein, the historian of technology David Channel claimed that a new "bionic world view" or a new concept of "vital machine" emerged in the second-half of the twentieth century because of the combined effect of the development of system building, cybernetics, computer science, artificial intelligence, new biomedical engineering like artificial organs and electronic

prosthetic devices, and genetic engineering. Many important developments that Channel described took place in the 1960s. Channel particularly emphasized the impact of the systems theory of Ludwig von Bertalanffy that was popularized in the 1960s by the Society for the General System Research (founded in 1954). The most interesting feature of systems theory was that some components of a particular system would function in a more organic way than the others. Similarly, some components are more mechanical than others. In other words, a system consisted of both organic and mechanical components, and it was therefore neither wholly organic nor mechanical. This certainly blurred the boundary between organic and mechanical realms (Channel 1991).[11] The systems idea, based on cybernetics and computer science, was used widely to explain biological, ecological, social, military, and world systems (Bertalanffy 1968).[12]

Artificial intelligence (AI) or a "thinking machine" was another field where the boundary between man and machine was blurred. Some primitive thinking machines had been available since the early 1950s, but various ideas and working models of AI machines were proposed since the late 1950s. Frank Rosenblatt's *Perceptron* (1958) was modeled after the human neuron network. It was advertised as the first machine capable of producing original ideas. The cybernetician Gordon Pask invented a machine with a sense organ for detecting a magnetic field. Around the same time, John McCarthy of the Massachusetts Institute of Technology (MIT) endeavored to create a computer program that would enable a machine to reason verbally. "Adaptive robots" to deal with changing situations were developed in 1960. In 1961, the US Air Force designed a machine that could distinguish between reward and punishment. Pask designed a programmable "teaching machine" that could perform the work of a tutor, and the Raytheon Company built a machine ("Cybertrons") that could solve problems for which no formula was known. The same year, automatic speech recognition, as well as translating, machines marked a significant advance. A reflex machine that could be conditioned was developed in 1963. The ambitious pattern-recognizing machine of the MIT, the Pandemonium, was also constructed. The idea of dynamic programming for the use of computers for decision-making was proposed in 1966. In 1969, the General Electric's "Cybernetic Anthropomorphous Machine"—a gigantic cyborg robot moved by following the movement of a human—surprised the world.[13] Yet, in spite of such remarkable achievements, AI machines were view with suspicion and considered more threatening than promising. Due to the blurring of the boundary between humans and thinking machines, man's ego could be affected. A kind of Frankenstein's fear that one's own creation would eventually destroy oneself was also widespread, as is seen in Felicia Lamport's poem, "A Sigh for Cybernetics."

> Thinking machines are outwitting their masters,
> Menacing mankind with ghastly disasters.
> These mechanized giants designed for compliance
> Exhibit their open defiance of science
> By daily committing such gross misdemeanors
> That scientists fear they'll make mincemeat of Wieners
> (1961, p. 57).

Also intriguing about "cyberscience" in the 1960s was the military support for its development. Information science, cybernetics, operational research, and computers were created as solutions to the increasing complexity of military operations during WWII. Information science was developed in the effort to maximize the efficiency of communication. Wiener's cybernetics was devised to effectively control a new hybrid system of anti-aircraft predictor. Operational research was exercised for the efficiency of military maneuvers. Electronic computers were built for the calculation of projectiles and the atomic bomb. The link between cyberscience and the military continued well into the sixties. The Perceptron (a neural-network computer) designed by Rosenblatt was funded by the Navy's Office of Naval Research. Navy was then eager to solve the problem of the increasing complexity of military operations by developing a computer that could learn. The Navy, as well as the Air Force, sponsored in the 1960s several symposiums on the self-organizing system. It was further developed by von Forester at the University of Illinois, whose laboratory was fully supported by the military. The Air Force also supported symposiums on bionics. The Air Force had been interested in communication networks in complex systems, and, as it is well known now, it was the Air Force that commissioned the ARPA (Advanced Research Project Agency) to devise the first computer network, the Arpanet, which later became the backbone of the Internet. The ARPA's IPTO (Information Processing Technique Office) supported computer science and research on artificial intelligence such as MIT's MAC project.[14]

However, although such military-supported research on artificial intelligence, communication theory, and systems theory eventually changed our understanding of the relationship between man and machine, the military technology that had the strongest impact on people's psychology of the man-machine relationship was the nuclear bomb. Nuclear bombs made the total annihilation of human beings possible, and people had to learn *how to live with* such horrible weapons. The most crucial problem of the sixties was "survival."[15]

Nuclear Weapons Out-of-Control

In the 1950s, important advances in nuclear weapons were made. Not only did nuclear bombs become more powerful and smaller, but they were installed on the warhead of the inter-continental ballistic missiles (ICBMs). ICBMs were made possible by the development of solid-fuel rockets and the accurate guidance system. As ICBMs gradually replaced old bombers, the nature of the decision to start a nuclear attack or counter-attack dramatically changed: from giving an order to launch bombers to pushing a button to shoot missiles. The psychological shift it accompanied was tremendous. In the case of bombers, the president would have two or three hours before the bombers reached the point of no-return. In the case of missiles, the ultimate decision to push a button should be made in just a few minutes, and was obviously irrevocable. Once fired, missiles could not be recalled.

John F. Kennedy was perhaps the first president with the power and burden to push the button. His inaugural address in January 1961 began with the statement that "the world is very different now; for man holds in his mortal hands the power to abolish all forms of human poverty and all forms of human life." But he seemed to sense the irony that peace in the nuclear age stood on the "uncertain balance of terror," since Kennedy, in the same address, stressed that "only when our arms are sufficient beyond doubt can we be certain beyond doubt that they will never be employed" (1988, pp. 82-84). In 1960, almost half of Americans believed that the Soviet Union was far superior to the United States in the nuclear capabilities. Although this alleged "missile-gap" turned out to be non-existent, Kennedy decided to accelerate the strategic missile program, adding 220 new nuclear missiles and doubling the production capacity of ICBMs. The United States apparently thought that they were in the defensive position, but the American armament was seen by the Soviet Union as monopolizing power at its best, and as preparing an aggressive attack at its worst. In 1962, a crisis took place first in Berlin, and then in Cuba, where the Soviets had installed some offensive missiles. When the Cuban crisis was at its peak, the world was on the brink of nuclear war. Although the US Secretary of Defense Robert McNamara later recalled that he had estimated the chance of a nuclear war as one in fifty, Kennedy privately estimated the chance as one in five (Chang & Kornbluh 1992). Bertrand Russell declared at that time that "We'll all be dead in a week," and students protested shouting "Invasion means Retaliation means Annihilation" (Rorabaugh 2002, p. 49).

From the 1950s on, and for some years after 1962, peace stood on a delicate balance of terror. RAND analysts like Bernard Brodie and Albert Wohlstetter

had developed the idea of nuclear deterrence on the ground that if each side had enough "second-strike" forces, each side would not attack the other first, and a condition for strategic stability (i.e., peace) would be created. As Winston Churchill aptly pointed out, "safety [is] the sturdy child of terror and survival the twin brother of annihilation" (Wholstetter 1969). In early-1960s, the Kennedy administration developed a new nuclear strategy called "flexible response." The US Secretary of Defense Robert McNamara changed the target of the US's counter-strike from the enemy's military forces to a wider range of targets, including its industrial power and populated cities. He systematized these principles and named it "Mutual Assured Destruction" in mid-1960s. The doctrine of Mutual Assured Destruction became an official nuclear strategy of the United States for some time, and this also became a strategic ground on which the Test Ban Treaty (July 1963) and the Non-Proliferation Treaty (1968) were signed. Mutual Assured Destruction was soon called by its critics "MAD" (Shapley 1993).

Renowned scientists—fifty-two Nobel prize winners—declared in the "Mainau Declaration" (1956) that "All nations must come to the decision to renounce force as a final resort of policy. If they are not prepared to do this, they will cease to exist" (Newman 1961, p. 198). The horrible impact of nuclear weapons on people's lives was also highlighted by the publication of a study of Robert Lifton. He had lived in Hiroshima for four months in 1962, and investigated the survivors' lives seventeen years after the bombing. There were many chilling stories and recollections in Lifton's studies, but the most horrible phenomenon was the survivors' intimate identification with the dead, incorporating the atomic disaster into "their beings, including all of its elements of horror, evil, and particularly of death" (Lifton 1963, p. 482). He then repeated a question that had been asked a few times previously: "Would the survivors envy the dead?" Lifton's answer was "No" because "they would be incapable of such feelings" (1967, p. 31). Nuclear-bomb survivors "would not so much envy as...resemble the dead" (p. 541). The nuclear war even destroyed the possibilities of symbolic survival.

However, uncertainty dominated horror. There was a deep and essential uncertainty on the issue of nuclear weapons. The strategic analyst Herman Kahn, the notorious "defense intellectual" at Rand Corporation, refuted the opinions of anti-nuclear scientists as "nonsense" and "layman's view." His "objective" and "quantitative" studies, performed from a "systems analysis point of view," showed that if a nuclear war occurred between the US and the Soviet Union, *only* forty to eighty million (40,000,000-80,000,000) US civilians would be killed. His point was that after the end of the war, civilization and economy could be rapidly rebuilt by the survivors: "[My]

thesis [is] that if proper preparations have been made, it would be possible for us or the Soviets to cope with all the effects of a thermonuclear war, in the sense of saving most people and restoring something close to the prewar standard of living in a relatively short period of time" (Kahn 1960, p. viii). The figure he provided, 40-80 million, was significant, because, according to Kahn's research, most Americans regarded ten to sixty million causalities as acceptable in the case of a total nuclear war. Sixty million (one-third of the total population at that time) casualties were the upper limit. Kahn thus claimed that only forty million US civilians would be killed if we carefully prepared for it. For all this, the US must have enough nuclear capability to launch a first strike in case the Soviet Union makes an outrageous provocation. But this was not enough, since it might just induce the Soviet Union to attack the US rather than provoking it. The US must therefore have enough retaliatory capacity to make the enemy's first attack unattractive. This thinking, Kahn proclaimed, was rational and logical. Anti-nuclear scientists were rendered irrational and illogical.[16]

Another strategic analyst, Albert Wohlstetter, criticized scientists' involvement in strategic decisions. He quoted Bertrand Russell's famous letter (1955) in which Russell said "I enclose a statement, signed by some of the most eminent scientific authorities on nuclear warfare," and then criticized it because "among the ten physicists, chemists, and a mathematical logician who were included, not one to my knowledge had done any empirical study of military operations likely in a nuclear war" (Wohlstetter 1962/3, p. 468). Scientists built the hydrogen bombs, but this did not automatically guarantee that they were the experts on the strategy of nuclear warfare. The issue of countermeasures in military conflicts, which involved political, military, and strategic (rather than technological) decisions, should be dealt with by a new discipline and new experts who relied upon "the [quantitative] method of science," not on "the authority of science."[17] Up to the early 1950s, scientists such as James Conant, Robert Oppenheimer, and Ernest Lawrence remained influential, but since then, nuclear strategies were developed by the new defense intellectuals such as Paul Nitze (ex-banker), Bernard Brodie, Henry Kissinger, Wohlstetter, Robert McNamara, Herman Kahn and Alain Enthoven (McNamara's Whiz Kids). In the early 1960s, Kahn was the most public, and notorious, expert in this new field of strategic analysis. He eventually became the model for Dr. Strangelove in Stanley Kubrick's movie *Dr. Strangelove* (1964).[18]

The uncertainty of the nuclear war was magnified by technology itself. Kahn identified five different ways in which nuclear war could start, and the most likely trigger was by accident such as false alarms, mechanical error, or human

errors. In the same article, he discussed the *Doomsday Machine*, a computerized machine that could destroy the entire earth, and the *Doomsday-in-a-Hurry Machine*, which was a Doomsday Machine for a different situation. Although Kahn concluded for the lack of strategic utility in such a Doomsday-machine family, it was very similar to the secret nuclear strategy of the 1950s known as the Sunday Punch (Kahn 1960b). Further, Kahn's discussion of the Doomsday machines and nuclear accidents was interpreted by most as indicating the probability that a nuclear war could be initiated by machines alone (1962). Wiener also warned that in a cybernetic war the decision to start the war would be made by an "electronic brain" (Wiener 1960). People feared that the computerized nuclear system including devastating bombs had become so complicated and out of control that a small mechanical error would trigger the entire system (Illson 1959). Eugene Burdick and Harvey Wheeler's novel *Fail-Safe* (published in 1962 and made into a movie in 1964) begins with a burn-out of a tiny condenser, which triggered a minor malfunction of the control system at Strategic Air Command Headquarters in Omaha, which eventually caused a bombing of a hydrogen bomb in Moscow. A worry about technology out of control was real and widespread. For instance, residents at Pomona, California, worried if the opening of their automatic garage doors might not accidentally launch guided missiles, because the test launch of missiles near the city caused the garage doors to fly open (Rorabaugh.2002, p. 39).

Since the late 1950s, nuclear weapons had "proliferated" like living organisms. The arms race was partially accelerated by the "potential *volatility* of military technology" (Zoopo 1965/6, p. 599). The situation became more complicated, because such technical uncertainty and uncontrollability could be, and in fact was, used strategically to make a nuclear threat credible to the enemy. This was evident in the US military official's statement that when the US military chose nuclear weapons, "we largely abandon to terms and results dictated by the nature of nuclear weapons" (Berry 1989, p. 56). John F. Kennedy stated a few times that the push-button weapon system was capable of both mechanical and human errors, and that a nuclear holocaust could occur through an act of inadvertence or irrationality. In his speech before the United Nations in September 1961, Kennedy explicitly warned that "every man, woman, and child lives under a nuclear sword of Damocles, hanging by the slenderest of threads, capable of being cut at any moment by accident or miscalculation or by madness" (Lapp 1968, p. 36). Politicians like Richard Nixon and Robert McNamara alluded that the US might start a nuclear war irrationally.[19] It was in this context that Erich Fromm lamented that the world was full of "impotent men directed by virile machines" (Fromm 1960, p. 1020). Paraphrasing the poet Emerson's phrase that "things are in the

saddle and ride mankind," Fromm claimed that "we still have a chance to put man back into the saddle" (1965/6, p. 34). However, this solution would not make everyone happy, in particular one who would think that "evil is not in things but in man. ... To Control the Bomb is absurd, [...] what we need to control is man" (Rougemont 1958, p. 48).[20]

Whose opinion should be trusted? That of Nobel laureates or the Rand Corporation? Kahn argued that anti-nuclear scientists were neither logical nor rational,[21] while SANE (National Committee for Sane Nuclear Policy) protested that any discussion of the actual use of nuclear bombs were insane and irrational. Kahn's system might be based upon a rational relationship among its parts, but seen as a whole, it seemed totally irrational. Rationality and sanity were at dispute. C. P. Snow noted that "between a risk [in the restriction of nuclear armament] and a certainty [in the total disaster], a *sane* man does not hesitate." But what could an ordinary sane man do? There was, however, one little thing that he could do, and that was building a nuclear shelter. The Kennedy government promoted the civil defense program, including building nuclear shelters. In 1961, a student at Radcliffe college wrote in her essay that "the construction of shelters has become...a fad, like the suburban swimming pool; for the rich, [it is] a new luxury, for the handy-man, a do-it-yourself toy." She however added that "the Bomb...is a sign of schizophrenic inconsistency" and the shelter thus represented "not a reasoned effort to survive but a senseless gesture." Schizophrenia was an apt metaphor for the mental status of humans living in the nuclear age (Adler 1961-2, p. 53-56).

Schizophrenic Man, Sane Robots

Schizophrenia was frequently invoked in discussions about the nuclear bomb in the 1960s. It symbolized the inhuman condition of the sixties. Fromm stated that "in the nineteenth century inhumanity meant cruelty; in the twentieth century it means schizoid self-alienation" (Fromm 1965/6, p. 33). Recall that Gregory Bateson, under the influence of Wiener's cybernetic ideas, had proposed a very interesting theory of schizophrenia in 1956. A person might become a schizophrenic if he had been forced to endure (while very young) a "double-binding" situation—a totally contradictory situation in which he could not win no matter what he would do. A typical double-binding situation was created in a family with a contradictory mother and the absence of a strong father (Bateson, *et al.* 1956).[22] Many people viewed the sixties as something like a double-binding situation. Nuclear horror and conflicting authorities "mobilize[d] and actualize[d] this world of schizophrenic," in which the total destruction of the world dominated, and the boundary between

reality and fantasy was obliterated.[23]

In his book *Burning Conscious* (1962), the Austrian philosopher Günter Anders wrote that the reality and the image of nuclear mass murder created the "raging schizophrenia of our day" where people act like "isolated and uncoordinated beings." Here schizophrenia was more than a metaphor. The book was a collection of the correspondences between Anders and the "hero of Hiroshima" Major Claude Robert Eatherly who was at that time suffering from "the delayed action of the atomic bomb on its possessors" (Eatherly & Anders 1962). In the 1950s, Eatherly had twice attempted suicide, been arrested for fraud, and alternated between court appearances and mental hospitals several times. He had been diagnosed as a schizophrenic. Bertrand Russell was sympathetic with Eatherly, emphasizing that insanity existed within the society, not within him. Defining the condition of mankind as the "technification of our being," Anders explained in his first letter to Eatherly that he who had been a screw in a "military machine" now wanted to be a human again. Being schizophrenic was the only way to revive his humanity or to live sanely in the crazy world.[24]

In one of his letters to Anders, Eatherly spoke somewhat hopefully of nuclear scientists.

> I would like to ask you some questions. Could we trust those nuclear scientists to delay their work and paralyze the political and military organizations? Would they be willing to risk their first love by giving up all the grants, laboratories and government support, and to unite and demand a trusted guardian for their brainchild? If they could do this, then we would be safe (p. 22).

Could science and scientists save people? A detailed study of nuclear armaments by two scientific advisors reached the pessimistic conclusion that "this [nuclear] dilemma has no technical solution" (Wiesner & York 1964, p. 35), which meant that the solution to the problem could not be found in the (techniques of) natural sciences. A respectable scientist, Theodore von Laue, was also pessimistic. To survive, he urged, "we must resolutely turn away from our reliance on science" (von Laue 1963, p. 5). Further, scientists were sometimes depicted as suffering from a sort of schizophrenia. For example, René Dubos stressed in his George Sarton lecture of 1960 that "many modern scientists suffer from the schizophrenic attitude," because of the disparity between scientists' claim about the usefulness of science and criticisms from anti-science activists who described scientists as "thoroughly dehumanized" and "mechanized" (Dubos 1961, p. 1209-10).

Dubos's comment is interesting, because it links a schizophrenic attitude to the "dehumanized" and "mechanized." Since the psychiatrist Victor Tausk's classic paper on the "influencing machine" in schizophrenia, it had been well-known that some schizophrenic patients felt as if they were influenced by a mechanical environment (thus the name "influencing machine"), and further that part of their body was projected onto the environment, resulting in the loss of "ego boundary" between the human self and the mechanical environment (Tausk 1991). The March 1959 issue of *Scientific American* reported a surprising story about Joey, a "Mechanical Boy," who thought of himself as a machine or robot while suffering from severe schizophrenia. Joey behaved as if he was a machine, being controlled by a remote control of his own fantasy. The imaginary machines that surrounded him had emotions and will power. He connected himself to various tubes and motors, but sometimes destroyed them with fury and then immediately connected himself up to bigger tubes and machines. Dr. Bruno Bettelheim who treated Joey discovered that his parents had transformed him into a type of machine by treating him "mechanically" without love or tenderness. Joey wanted these machines to dominate his mind and body because it had become too painful for him to be a human. The doctor therefore tried to revive the sense of human trust and feelings inside him. As Joey made progress, he gradually regained control of the mechanical environments around him. Then, he became able to relate emotionally to people. Bettelheim remarked that "robots cannot live and remain sane," because they will become "golems" and "destroy their world and themselves." Before this happened to Joey, humanity went back into the saddle and saved him (Bettelheim 1959).

But machines entered the scene again. Five years later, in 1965, the *New York Times* published an article that reported the use of a machine, the *Computerized Typewriter* (Edison Responsive Environmental Learning System), to successfully treat autism, where standard psychotherapy had failed and no cure or cause was known. The *Computerized Typewriter* was a human-like machine: it talked, listened, responded, and drew pictures, but it never punished. The doctor who treated autistic children with the machine had noted that many of these children had an abnormal preoccupation with mechanical objects. Several boys who had refused to speak to humans began talking with the machine. After a year's of therapy, they began to respond to human conversation. Some were able to return to school (Sullivan 1965). It was an irony that a man-made machine—the nuclear bomb—pushed people into a schizophrenic mentality (metaphorically), but another machine—the communication device *Computerized Typewriter*—in effect treated it.

Conclusion: From Intelligence to Emotions

In the 1960s, people perceived and expressed new relationships between man and machine. Automation, system theory, cybernetics, genetics, information theory, artificial intelligence, computers, and atomic weapons contributed to these new visions. The visions ranged from optimism to apocalyptic pessimism. Some were close to reality, while others were metaphoric, imaginary and fantastic. The underlying philosophical questions, however, were similar: How could we retain our essential humanity in such a machinized age? What could make us more than machines? As I cited in the epigraph at the beginning of this paper, the first Pugwash Conference urged participants to "remember your humanity and forget the rest." Because "if you can do so, the way lies open to a new Paradise"; but "if you cannot, there lies before you the risk of universal death." But what was, and where lay, our essential humanity? (Wohlstetter 1962/3, p. 471)

Since the time of Aristotle, Western people have believed that "the soul" or "the self" could distinguish humans from non-humans.[25] The manifestation of the soul's capacity is most clearly expressed in Descartes's *cogito*—a capacity of reasoning or intelligent thinking. Animals could feel, but they could not think. Animals were machines. Therefore, non-animal, man-made machines—mechanical clocks, Vaucanson's defecating duck, the self-acting loom, the steam engine, and the telegraph—could not think either. But would this distinction remain valid in the age of automation, cybernetics, intelligent computers, self-reproducing automata, and the computerized Doomsday machine? Not only did machines show intelligence, but biologists discovered that bacterial cells had *a kind of* intelligence too.[26]

What kind of machine is man? A biomedical scientist asserted that man was just a machine with a certain amount of disorder built into DNA (Potter 1964). Cyberneticians and AI experts claimed that there was no essential difference between man and machines. In a popular exposition of the Turing machine and automata, John Kemeny concluded that "there is no conclusive evidence for an essential gap between man and a machine [like an electronic computer]; for every human activity we can conceive of a mechanical counterpart" (Kemeny 1955, p. 67). Using an evolutionary metaphor, Bruce Mazlish emphasized that the distinction between man and machine had almost disappeared. He epitomized it in the discourse on "fourth discontinuity." Throughout human history, Mazlish argued, there existed three great thinkers who destroyed man's naive self-love: Copernicus, who abolished the discontinuity between the earth and the universe; Darwin, who eliminated the discontinuity between man and animals; and Freud, who erased

the discontinuity between the conscious and unconscious. But "a fourth and major discontinuity, or dichotomy, still exists in our time; it is the discontinuity between man and machine" (Mazlish 1967, p. 3). This discontinuity would be eliminated in the near future, Mazlish continued, if we realized a continuity between man and machines. Herbert Simon also noted that "as we begin to produce mechanisms that think and learn, [man] has ceased to be the species uniquely capable of complex, intelligent manipulation of his environment" (Diebold 1965, p. 152). So did Wiener, who claimed that "machines can and do transcend some of the limitations of their designers" (1960). John von Neumann, the designer of the stored-program computer and the first automata, pointed out that, to survive technology, we must understand three (not one) essential human qualities: patience, flexibility, and intelligence. Intelligence alone was not enough, because some machines could think (von Neumann 1955).

Even if computers were said to think, it seemed that computers could not feel. Emotions and feelings could be considered to be something uniquely human. However, the idea that emotions interfere with rational thoughts is as old as the Western intellectual history. Cicero thought that emotions were hasty opinions, and Augustine believed that Gods and angels do not have emotions. In the 1960s, "defense intellectuals" nearly unanimously blamed emotion as an erroneous human impulse that would ruin the rational choice of the optimum strategy. The senior RAND researcher Bernard Brodie had warned in the 1950s that strategic analysis should not be tainted by human emotions induced by the imagination of the horrors of nuclear wars. Kahn asserted:

> It is not that the problems [of war and peace] are not inherently emotional. They are. It is perfectly proper for people to feel strongly about them. But while emotion is a good spur to action, it is only rarely a good guide to appropriate action. In the complicated and dangerous world in which we are going to live, it will only increase the chance of tragedy if we refuse to make and discuss objectively whatever quantitative estimates can be made (Kahn 1960a, p.47 n.1).

Robert McNamara told an interviewer in 1963: "You can never substitute emotion for reason. I still allow a place for intuition in this process, but not emotion. They say I am a power grabber. But knowledge is power, and I am giving them knowledge, so they will have more power" (Shapley 1993). He also developed a way to intellectualize emotions.[27] McNamara's use of neutral and emotionless language such as "spasm response," "megadeath," and "counterforce collateral damage" partly served McNamara's purpose. Arthur

Koestler also proclaimed that our irrational beliefs and paranoia were anchored in emotion, and further that we must develop techniques to cure the split between reason and emotion (which he called "schizophysiology") to survive as a species in the nuclear age. He proposed an artificial tampering with human (emotional) nature as one possible measure to cure this schizophysiology (Koestler 1967, p. 289; p. 327). The psychologist Paul T. Young, in the conclusion of his textbook on emotion, declared that understanding emotions under the threat of nuclear war and total destruction was immensely important, because such an understanding "can help to make us tolerant of the weaknesses and limitations of others" (1973, p. 444). He, however, put more emphasis on the role of reason than that of emotion in stating that "the ultimate destiny of man on this planet may depend on whether or not reason and sanity can dominate behavior." Such segregation between reason and emotion was supported not only by an old dictum that the seat of thoughts is in the brain whereas that of emotions in the heart, but also by the contemporary neurophysiological theory of the brain, called the Papez-MacLean theory of emotions. To put it briefly, the theory distinguished between the limbic system (the reptilian and primitive mammalian brain) and the neocortex ("human thinking-cap" responsible for language and symbolic thinking) in human brains, and considered the limbic system to be the seat of emotions and the neocortex the seat of reason. The gap between reason and emotion was the gap between "the newest and most highly developed part of the brain" and "the crude and primitive system" (Koestler 1967, p. 283-289).

Throughout the 1960s, however, new perspectives on human emotion gained a wider public recognition and support, although this deserves more studies than is presented here. First of all, the physiological basis of human emotions was explored further. The sixties was the period of chemical drugs. For example, in 1958, dimethylaminoethanol (DMAE) was discovered to have an anti-depressive effect. This "happy drug" was widely used in the 1960s. In 1963, the tranquilizer Valium was introduced. The psychologist James Olds, who had found the "pleasure centers" of the brain of rats in the 1950s, reported that human brains had similar points, which, if stimulated, produced quasi-orgasmic sexual pleasure. Manfred Clynes, who first coined the term cyborg as an organism-machine hybrid in 1960, claimed ten years later that human emotions could be artificially created by inducing a musculo-skeletal signature in the nerve system. In 1970, he proposed "Cyborg II" as a man-machine hybrid for space travel, but this time, the new cyborg embodied a mechanism to produce artificial emotions (Clynes 1995).

Secondly, and more importantly to our discussion, the cognitive theory of

emotion was proposed. Pascal once said that "the heart has reasons that reason does not know at all." Contrary to the dichotomy between reason and emotion, the new cognitive theory of emotion proposed that emotions served a cognitive function supplementary to, and along with, rational thoughts. Human emotion and reason were not two separate entities, but overlapped considerably. Emotion, according to the new theory, was a kind of appraisal or assessment, which frequently involved a human action toward or away from a person, thing or situation. To perceive something emotionally meant that it was appraised as desirable or undesirable, valuable or harmful to us. Our fear of nuclear war was caused by our concern that our lives and dignity were endangered by it, and by our uncertainty about how to cope with it. Emotion represented a person's concern; or more precisely, emotion was created out of the interaction between our concerns and situational meanings. Emotion was dependent upon interpersonal, social, and cultural contexts. Emotion was also dependent upon the ways in which we view the situation, and the possible choices open to us. Fear, anger, remorse, happiness, and jealousy were seen as a kind of reason.[28]

In this sense, emotion was uniquely human. Isaac Asimov asserted in a popular article that "[what] the computer can not equal the human brain is their feelings." J. Bronowski accepted it as the truth that the computer is not merely a set of gears, wheels or electrical circuits, but it is a flexible, self-regulating (feedback) machine with mechanized inputs and outputs. The computer as a feedback machine can think that "I won't do this again because it hit others last time," Bronowski argued, because the hitting can be calculated by using the formal Newton's law. There is, however, an essential difference between humans and computers: Only humans are able to think "I won't do this again because it embarrassed others last time." Bronowski explained that since we recognize ourselves in others in this mode of thought, this is knowledge of the self (Bronowski 1965, p. 20-23). We can, however, see that it is a thought imbued with human emotion. One's concern about others, as well as oneself, were reflected in this knowledge. In the same vein, an expert in artificial intelligence opposed the idea that humans and computers were identical:

> If machines really thought as men do, there would be no more reason to fear them than to fear men. But computer intelligence is indeed "inhuman": it does not grow, has no emotional basis, and is shallowly motivated. These defects do not matter in technical applications, where the criteria of successful problem solving are relatively simple. They become extremely important if the computer is used to make social decisions, for there our criteria of adequacy are as subtle as

multiply motivated as human thinking itself (Neisser 1963, p. 197).

Human intelligence had an emotional basis and was deeply motivated. In human beings, emotions and feelings were intertwined with reason and intelligence.

Emphasizing emotion also became a popular theme in science fiction novels. Philip Dick's *Do Androids Dream of Electric Ship* (1965), which was later made into the movie *Bladerunner*, depicted that the essential quality of humanity shifted from reason and rationality to emotions and feelings.[29] As Alfred Whitehead had maintained, more people in the sixties believed that "our experience of love and beauty" was not just feelings, but "moments of metaphysical insights" (Matson 1964, p. 256-57). The case of Joey the Mechanical Boy was even dramatic. After several years of treatment, Joey went out of the hospital for a Memorial Day parade. He carried a sign that said: "Feelings are more important than anything under the sun" (Bettelheim 1959, p. 126). In the age of smart machines and nuclear holocaust, emotion and feelings became what would make the essence of humanity.

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[1] I thank Evelyn Fox Keller, Kyung-Soon Im, Hong-Ryul So, Janis Langins, and the anonymous referees for their helpful comments on the draft of this paper.

[2] For an interesting discussion on the development of pesticides in the context of a "total war" against insect enemies, and Carson's usage of nuclear fallouts as a metaphor for chemical pollutants, see Russell (2001). Movies in the 1960s are well analyzed in Edwards (1997).

[3] For Wiener's "first-wave" cybernetics, see Wiener (1948) and Galison (1994). For a pre-history of cybernetics including research in the Bell Lab and Sperry Gyroscope Company

before 1945, see Mindell (2002)..

[4] Geof Bowker (1993) has pointed out that such religious claims—to create a new life or to destroy the earth—was one of the strategies that cyberneticians used to make cybernetics universal. For second-wave cybernetics, see Hayles (1999, pp. 6-11; 72-76).

[5] For Clynes and Kline's cyborg in 1960 and cyborgs since then, refer to Gray (1996). See also Stephen (1965); Toffler (1970).

[6] For such periodization, see Simpson (1964). For the status of automation in the mid-1960s, see Seligman (1966).

[7] For Marcuse in the 1960s, see Mendelsohn (1994).

[8] For Mumford's megamachine, see also Mendelsohn (1994, ppp. 167-170) and , "Politics of Pessimism," pp. 167-170 and Miller (1990).

[9] see Mendelsohn (1994, p. 169). A later investigation revealed that the 1965 electric failure was largely due to the multiplied complexity of the electric power system that transcended the control of humans. See Carroll (1969).

[10] The term robot means a slave or servant in Czech or Polish. The Latin word servo (in servo-mechanism) also means a slave. The term robot was first used in Karl Capek's play R.U.R. (1923). The term robotics was first used by Isaac Asimov in his novel "Runaround" (1942) which begins with his famous "Three Laws of Robotics." See also Edwards (1997, pp. 315-327) For a critical discussion on the notion of technology-out-of-control, see Hong (1998).

[11] The interconnectedness among the parts, as well as the holistic nature, of a (technological) system was recognized as early as by Edison, but Bertalanffy's system theory was different from old ideas in that it argued some components are mechanical while others are organic.

[12] But while used in such a overarching way, Bertalanffy soon deplored, the systems idea itself became another "technique to shape man and society ever more into the 'mega-machine'" (Winner 1977, p. 289).

[13] See the following articles for further information: "Computer Develops Capacity to "Learn"," *New York Times* (4 Jan. 1958). "Thinking Machine Projected at MIT," *New York Times* (25 Nov. 1958). "A. M. Andrew, "The Perceptron: a Brain Design," *ibid*., p.1392; "Reason-Machine Seen for the Future," *New York Times* (24 March 1959); "Automation Gets a Language Tool," *New York Times* (26 Feb. 1959). See also "A Robot Machine Learns by Error," *New York Times* (15 Aug. 1961); W. K. Taylor, "Adaptive Robots," *The New Scientist* 8 (29 Sep. 1960), 846-848; Gordon Park, "Machines that Teach," *The New Scientist* 9 (11 May 1961), 308-11. "Robot Multiplies Man's Strength," *New York Times* (3 Apr. 1969).

[14] See Edwards (1997); Keller (manuscript). For the ARPA and IPTO, see Abbate (1999).

[15] Theodore M. Hesburgh's comment on Charles P. Snow's lecture on Weaver (1961). In 1968, Arthur Koestler summed up the crisis of the time in a single sentence: "From the dawn of consciousness until the middle of our century man had to live with the prospect of his death as an individual; since Hiroshima, mankind as a whole has to live with the prospect of its extinction as a biological species" (1974, p. 11).

[16] See James Newman (1961). Kahn's weakness, as another reviewer pointed out, lay in the neglect of the "human condition in the post-attack period" such as "the behavior of groups, individuals, and leaders under extreme threat, in the face of sudden disaster, or in ambiguous situations" (Michael 1961, p. 635). In Dr. Strangelove (1964), Stanley Kubrick parodied Kahn by having General Turgidson claim that [there are] "two admittedly unfortunate scenarios—one where we've got 10 million killed and another where we've got 150 million." I thank an anonymous referee for this phrase.

[17] In Wohlstetter (1962/3), he criticized C.P. Snow, Edward Teller and Hans Bethe, who had "hostility to the fact of hostility itself" and tended to "think of harmony rather than conflict" (p. 474).

[18] Newman's statement is riveting:

> Is there really a Herman Kahn? It is hard to believe. Doubts cross one's mind almost from the first page of this deplorable book: no one could write like this; no one could think like this. Perhaps the whole thing is a staff hoax in bad taste. The evidence as to Kahn's existence is meager. ... Kahn may be the Rand Corporation's General Bourbaki, the imaginary individual used by a school of French mathematicians to test outrageous ideas. The style of the book certainly suggests teamwork. It is by turns waggish, pompous, chummy, coy, brutal, arch, rude, man-to-man, Air Force crisp, energetic, tongue-tied, pretentious, ingenuous, spastic, ironical, savage, malapropos, square-bashing and moralistic. ... How could a single person produce such a caricature? (1961, p. 197)

[19] See also Weart (1988).

[20] See also Pitt (1990), where he stated that "those who fear reified technology really fear other individuals; it is not the machine that is frightening, [but] it is what some individuals will do with the machine" (p. 129).

[21] A concerned pacifist stated that "in spite of all this Mr. Kahn is no warmonger, on the contrary; individual passages sound, though sacrificing consistency, rather unprejudiced and almost pacifistic" (Schneid 1970, p. 256).

[22] Bateson reconstructed the theory of schizophrenia in terms of the breakdown in the system of meta-communication.

[23] For a contemporary analysis, see Segal (1998), esp. pp. 42-44 (on his discussion of "the

world of schizophrenics" created by the prospect of the atomic war).

[24] Eatherly's condition was diagnosed as follows: "An obvious case of changed personality. Patient completely devoid of any sense of reality. Fear complex, increasing mental tensions, emotional reactions blunted, hallucinations" (Eatherly & Anders 1962, p. xviii).

[25] The search for the soul in the mechanized age is the central theme of many science fictions. See Schelde (1993, p. 126).

[26] For the "bacterial intelligence," see Potter (1964, p. 1020).

[27] An interesting feminist analysis of the emotionless language of defense intellectuals can be found in Carol Cohn, "Sex and Death in the Rational World of Defense Intellectuals," *Signs* 12 (1987), 687-718.

[28] For the new cognitive theory of emotions, see Ellis (1962); Arieti (1963); Arnold (1960); Lazarus (1966). The seed of the "emotional revolution" was thrown in the 1960s, but it was fully flourished in the 1990s. For recent discussions of human emotion, see de Sousa (1991); Damasio (1994); LeDoux (1996).

[29] In this movie, as Halyes points out, one of the most interesting scenes is the use of the Voigt-Kampff test to tell humans from androids. The test detects human emotions linked to their memoris and thoughts (Hayles 1999, p.175).

In Defense of Hyperlinks: A Response to Dreyfus[1]

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An international group of technophiles known as the Extropians promise us a future in which digitized humans live forever in cyberspace, all the world's accumulated knowledge just a thought away. Hubert L. Dreyfus, on the other hand, promises that if we were digitized, we would find ourselves in the position of having "to give up being able to retrieve most of the information we needed" (Dreyfus 2001, p. 94). He sees the roots of this disastrous state of affairs in current search engines. He suggests that, because the Internet is anarchically structured, entirely lacking in a central organizing authority, people must depend on search engines to locate information for them. Search engines, however, are computer programs, capable of manipulating purely syntactic symbols but unable to understand semantic content. They are then charged with the impossible task of locating relevant semantic content based on syntactic analysis. Thus, Dreyfus warns, to the extent that we make ourselves dependent on search engines, to that extent we cut ourselves off from the vast quantities of knowledge we have archived on the Internet.

As a cautionary fable for users of technology, Dreyfus' thoughts are invaluable. If, however, he is seriously suggesting that in using search engines we risk obscuring centuries of acquired human knowledge, it may be that he is guilty of the same sort of extremism as the Extropians whose cypertopia he delights in dissecting. In this essay, I suggest that the document organization present on the Internet—which is to say, no central or authoritative organization at all—has important strengths that Dreyfus ignores. I then describe the salient feature of a search engine that will be able to piggyback on human judgments of relevance, dramatically improving our ability to locate documents on the Internet. Contrary to Dreyfus' dim view, moving documents from libraries to the Internet might allow us to ask questions that have been difficult or impossible to ask in the past.

The strengths and weaknesses of hierarchies

Libraries are at the root of all Dreyfus' talk of hierarchies. It is not hierarchies in the abstract that are threatened by the advent of the Internet, but libraries in particular. Before undertaking an examination of the Internet, it is important to understand how, for Dreyfus, libraries, as archetypical hierarchies, draw their power from their very structure.

Three classes of people participate in the functioning of a library. The first is the expert who designs the hierarchy that the institution will use to organize its holdings. This expert is extremely well versed both in "the meanings of the terms involved, and the interests of the users" (p. 9). (Melvil Dewey is an example of such an expert.) The second class of people is the librarians that populate the hierarchy with books. They read enough of a given book to understand its contents, and then place it in the appropriate branch of the hierarchy. Finally, there are users who walk the hierarchy to find the subject in which they are interested. When they have found it, they will be presented with all the books that were placed there by those who populated the hierarchy.

The appeal of this method of storage is that information has been grouped together by a person who understands what information *ought* to be grouped together. We can imagine a hierarchical classification with "books" as the root. Each branch will be defined as "books about x," with 'x' growing increasingly specific with each branching iteration. The leaves of the hierarchy will be very specific branches, containing a few books. This way, if I seek a book about 'x,' I simply pluck that leaf (or branch, depending on how specific my interest is) from the tree, and I should have every single book in the hierarchy that is relevant to my query. For example, if I would like to learn about Sir Gawain, I need only descend from "Literature" to "Medieval Literature" to "Arthurian Romance" and so on, until I eventually come to the category labeled "Gawain." Here, the librarians will have placed every book they read and judged to be about that particular knight.

There are two significant problems with these sorts of hierarchies. The first is that certain documents resist being placed in them. But even an unattainably perfect hierarchy, in which this problem had been solved, would face a possibly more significant problem: the class of queries answerable by the hierarchy is very small, and probably doesn't capture the very queries that tend to interest us most as humans. I will discuss both of these problems in more detail, to make clear exactly what they are, and how it is that they both have as their source the hierarchical structure itself.

The first problem, that of documents resistant to placement, is a problem with the implementation of hierarchies. But it is a significant problem—in a strict hierarchical system, a book that will not "fit" into the hierarchy is either left out, or forced into a leaf that is not entirely appropriate. In either case, the thoughts in that book are as good as lost to browsers of the library.

The problem of fit seems to appear in most, if not all, hierarchies of substantial complexity. It certainly appears in what is perhaps the most famous of all hierarchies: the taxonomy of living things. This hierarchy, the product of innumerable devoted scientists, all, presumably, experts, is far from perfect. Life is simply too complex and varied to be conveniently classified. Take, for example, the historical problem of the euglena, a single-celled organism that locomotes (an important feature of animals), but also photosynthesizes (an important feature of plants). For many years, the euglena was classified as a plant, despite its clearly animal characteristics. The result was that a strictly hierarchical search for "all creatures that self-propel" would miss the euglena, because it was filed in a branch of the tree that explicitly includes only those things that don't locomote.[2]

The source of the problem is that the structure of the taxonomic hierarchy insists that each organism be placed in one and only one category. (I will discuss, shortly, the most common method of addressing this problem in libraries.) It further insists that, while each category may have multiple children, it has one and only one parent. Under these conditions, the euglena is one of a number of examples of obvious problems of fit.[3]

Given the difficulty in classifying organisms, can we reasonably expect a rigorous taxonomy of ideas? Our ideas about animals are but a tiny subset of the entire corpus of human ideas. Classifying this subset has proved to be an intractable problem, and one may be confident that to classify the entire set will be much, much harder. This is challenge that libraries face.

Current libraries try to mitigate the problem of fit by permitting a single book to be filed in multiple categories. Dreyfus acknowledges this, but is adamant that the practice does not change the fact that, "there is an agreed-upon hierarchical taxonomy" (p. 110). His insistence that cross-referencing has not entirely undermined the hierarchical nature of the library makes him sound almost nostalgic for the Dewey Decimal System, which requires that one book have one and only one category. Such nostalgia would make sense, because the logical conclusion of the trend—the filing of a document in every category to which it is relevant—looks very little like hierarchy, and very much like the Internet. In other words, if the current techniques of cross-referencing were extended, the result would be the same leveling of content and undermining of meaning that Dreyfus sees on the Internet. If he is to argue for the power of hierarchies, he must resist their dilution through cross-referencing.

The second major shortcoming of a hierarchy (even a hierarchy that somehow managed to solve the problem of fit) is that it is not well suited to

many types of questions that interest us as human beings. There are at least two sorts of queries it cannot handle: queries that are interested in the relationships between objects, instead of the objects themselves, and queries that are interested in features of the objects that were considered incidental to the hierarchical branching principle.

Hierarchies are bad for relating information because there are no links other than the mother/daughter sort. If I am interested in the relationship between two leaves, I must trace up each of their branches until I find an ancestor node they share. While the common ancestor sort of relationship is important in some cases, it reveals nothing about the potentially numerous direct and meaningful connections between the leaves. For example, if I am interested in the relationships between the *Book of Job* and Chaucer's "Clerk's Tale" in *The Canterbury Tales,* the only sort of relationship the hierarchy can reveal is found in the common ancestral node. It is hard to imagine that such an ancestral node is any more specific than "Literature," which is not a very interesting relationship to note.

The history of databases reveals the practical shortcomings of hierarchical structures. Databases of one sort of another have been around almost as long as computers. First generation databases were "flat." That is, they were discrete tables of information, unable to relate the tables, or the data, to each other. This sort of data storage is very limited, both functionally and technically, and in the late 1950s, a great deal of research was done to develop a more powerful database. The result was a hierarchical database. Hierarchical databases dominated throughout the 1960s, but they were subject to shortcomings of their own. Although they did allow for some kind of relationship between data, they forced the user to represent all relationships as mother/daughter. This made it fantastically difficult to relate the stored bits of information in the innumerable ways that it was naturally related. During the 1960s, more research was done, and by the '70s, hierarchical databases had been entirely supplanted by relational databases. In relational databases, no relationships are dictated by the database's structure and the user of the database can define any relationship between any of the bits of data. Today, every widely-deployed database system (MySQL, Oracle, Access, etc.) is relational. The important thing to note from this brief history is that in relational databases, no piece of data is treated as more or less important by the structure of the database, and no relationships between the data are imposed or implied by the structure itself. Any piece of data can be linked to any other piece of data. In other words, these relational databases are, in spirit and in structure, much more closely related to the Internet than they are to hierarchical databases or libraries.

In addition to obscuring relevant relationships between objects, a hierarchy ignores the aspects of a work that are secondary to the hierarchy's branching principle. For instance, if I want to read up on breast cancer, a hierarchy might be very convenient. But if I am interested in works of fiction featuring characters with breast cancer, the hierarchy is useless. The same rigorous structure that makes the first query so convenient makes the second query impossible. Because most books will have many aspects, while each branch of the hierarchy can recognize only one, there are many more potential queries of the second sort than the first.

It is worth emphasizing that these "secondary" aspects are secondary in the hierarchy, and not necessarily in the book. Examples of books with multiple, important, levels of meaning abound, particularly in fiction. Is *The Crucible* about a puritanical town in 1692, or McCarthyism in the 1950s? In the attempt to decide on the book's "primary" subject, we are forced to favor either the intent of the author (in which case we would claim it is about American society in the 20th century) or the obvious subject matter of the book (in which case, it is about puritans in the 17th). Clearly, it is about both, and if a hierarchy forces us to choose a single subject under which to file it, it does us a disservice—whichever subject we choose, we will obscure an important aspect of the book.

The same method that was used to address the problem of fit, namely, cross-referencing, can be applied to mitigate the problem of secondary aspects. In the case of *The Crucible*, it looks like cross-referencing might be successful. File it under both relevant subjects, and the problem is solved. Such cross-referencing, however, can only be successful so long as we assume that all books have a small number of aspects. But this is not the case. The overwhelming majority of books will have many aspects, ranging from the centrally important to the tangential or trivial. The question we must struggle with, if we are to adopt the method of cross-referencing is: in how many categories is it reasonable to file the same object? Too many and the result is a hierarchy that has been undermined and leveled, too few and the result is the obscuration of relevant aspects of things.

What I mean by "leveled" here might need an illustration. A hierarchy such as a library is designed to have a large number of objects at the root, and very few in the leaves. For instance "literature" as a root node will have many books associated with it, but a terminal subject heading like "literature about regicide in 17th century Britain" will have relatively few. The problem with filing a book in multiple categories is that there are books like *The Brothers*

Karamazov, *The Iliad*, and *Moby Dick*, that are obviously relevant to a broad range of different subjects. If we suppose that there are many books of this sort, then we have many books each filed in many categories, and the terminal leaves of the hierarchy swell in size. A hierarchy in which the leaves have swollen to the size of the root is fully leveled and entirely useless. In general, a swelling of the leaves corresponds to a leveling of the hierarchy, and a reduction in its utility. Dreyfus sees the Internet much like a fully-leveled hierarchy. The structure of the Internet is such that the pool of documents that must be examined for any query is the entire body of documents on the Internet. This is no different than a "hierarchy" in which every document is filed in every terminal leaf.

The fact is that libraries *must* obscure relevant aspects of books in order to avoid this leveling and maintain their utility. Libraries are designed to answer the question "what is an example of a book about x?" and the only way this question can be answered is if a judgment about *the* topic of a book has been made. Cross-referencing is designed to avoid the problem of books that clearly have a small number of obvious, centrally important, subjects. The method of cross-referencing is simply not intended to allow a book to be filed in every category to which it is in some way relevant. Thus, even with cross-referencing, libraries are bound to obscure books that may be relevant to a user's query.

Dreyfus is right to claim that, in the evolution of the Internet, "no authority or agreed-upon catalogue system constrains the linker's associations" (p. 8). But we have seen the centrally organized, authoritative structure of even an ideal library can seal off important meaning by obscuring relationships between entities as well as by ignoring "incidental" or "secondary" aspects of objects. While the non-authoritative, non-agreed-upon, and seemingly chaotic structure of the Internet may make document retrieval more challenging, its structure does not, like that of hierarchies, seal off important areas of meaning.

The strengths and weakness of search engines

Search engines are subject to the same shortcomings that face every computer program. Thus, they succumb to Dreyfus' critique of strong artificial intelligence[4]: they will never (or at least not in the foreseeable future) be able to understand semantic content.[5] This is a major problem for search engines because, presumably, without being able to understand the documents they index, they will not be able to judge their relevance to any given query. This understanding of search engines is at the core of Dreyfus' grim presentiments

of the Internet's future. Dependent on search engines for all our document retrieval, we will never be able to know when better, more relevant documents were overlooked. Perhaps worse, we may be mollified by mediocre documents and never think to ask the question "how many better documents are out there?" As we move an increasing number of documents online, we risk losing them in a vast sea of other documents that neither we, nor the search engines, can navigate.

In developing his argument concerning the shortcomings of search engines, Dreyfus treats the matter of a computer's inability to judge matters of relevance in more detail. He gives the example of an allergy-prone jockey who finds himself on a racetrack covered in hay. The astute observer, noting the hay, will not bet on the allergic jockey. To get a computer to make the same move would be difficult, because the matter of hay on the track seems irrelevant to any discussion of shrewd betting strategies. The problem facing the computer is that "everything we know can be connected to everything else in a myriad meaningful ways" (p. 20). These myriad meaningful relationships cannot possibly be made explicit and programmed into a computer.

While Dreyfus is surely right that this is a problem for intelligent systems in general, and search engines in particular, this very claim is a hint that we might be on the right track with the radical interconnectedness of the Internet. It is certainly true that "everything we know can be connected to everything else in a myriad meaningful ways," and the Internet mirrors this with its anarchical structure. Hierarchies like the Dewey Decimal System, on the other hand, acknowledge exactly one meaningful connection: that between the mother and daughter node of the tree.

Where does this leave us? It would be unfortunate if the anarchic structure of the Internet allowed for more meaningful connections than a hierarchy, but the poor quality of search engines left us bobbing in a sea of irrelevant documents nevertheless. Given that Dreyfus is right that a search engine will never be able to read and understand the contents of a document on the Internet, is there hope for web searches?

The hope lies in the very hyperlinks that Dreyfus declares overly hyped. Where he seems to go wrong is in claiming "everything *is* linked to everything else on a single level" (p. 10, emphasis mine). What he should claim is that everything *can* or *could* be linked to everything else. It is important that it is not. The crucial fact he misses is that the human beings who write and read the content of web pages create the links. They

understand the semantic content of the pages they work with, and they create links between them. There is meaning in these links. Every link is a marker of a relationship that was observed and hard-coded by a full-blown human being. Like the librarians who read books and place them in the appropriate branch of the tree, the authors of web pages read other web pages and place them in relationships with their own. Dreyfus is unfair to the Internet, then, when he asserts that everything *is* connected to everything else. This is plainly not the case. If everything *were* linked to everything else, meaning on the Internet would be undermined. Similarly, if the hierarchy in a library were randomly designed, meaning in the library would be undermined. Neither system functions this way in theory or in practice, and it is not revealing to accuse either system of potentially allowing such abuse.

If there is meaning in hyperlinks, then a search engine can use them to improve its results. One straightforward way that search engines can make use of links would be to observe them to identify groups of web pages. Presumably, such groups will naturally form around most any subject imaginable. For instance, a site devoted to Plato's *Republic* will have more links to sites about *The Republic* and closely related topics, and fewer links to sites about, say, evolutionary psychology or the latest Star Trek movie. Likewise, a Star Trek fansite will contain more links to Star Trek related sites than to cooking or Cubism sites. Generally, a page devoted to a given subject will contain more links to other pages on the same or related subjects than it will to unrelated pages.

By observing networks of links and looking for clusters, a search engine could identify groups of web pages. After a search engine has identified groups of related pages, it is in a much better position to guess at meanings and, piggybacking on human judgments of relevance, make relevance judgments of its own.

Search engines like Google[6] already make use of link tracing in their algorithms, although not in quite the way I am suggesting. Google, for instance, observes the links that point *to* each page it indexes. It treats each link as a "vote" for the indexed page. It then uses these votes, combined with the strength of the search-string match, to rank the pages that are returned to the user.[7] The idea behind Google's page-ranking algorithm is that the more links there are <u>to</u> a given page, the more people read that page, judged it to be of high quality, and linked their own pages to it. Thus, by observing the behavior of linking, Google can glean information about human judgments of quality—judgments it could not possible make for itself. The central

difference between Google's technique and the one I am proposing is that Google tries to piggyback on human judgments of *quality*, while I suggest piggybacking on human judgments of *relevance*.

An example: suppose I search for "Star Trek news information" on my proposed search engine. There are a number of Star Trek sites on the 'Net and, presumably, they tend to link to one another. In short, the search engine can identify a group of Star Trek pages. Now, suppose there is a web page that contains the text: "I hate Star Trek, because (among other reasons) the people who put up fansites rarely update their news, making it impossible to find reliable information." This page, written by someone who dislikes Star Trek fansites, will not link to any, and therefore will not be part of the group of Star Trek related sites. Therefore, despite the fact that the isolated page[8] contains all the words in my search string, the search engine can guess that it is likely irrelevant to my query. The search engine, then, has used the anti-Trek author's own judgment of relevance, made evident by his failure to link himself to a Star Trek group, to make a recommendation to the user: don't bother with this page.

Another example from the Star Trek milieu: suppose a dedicated fan of the Klingon language has put up a web page devoted to the syntax and vocabulary of this alien tongue.[9] Further suppose that this fan treats Klingon as if it were a real, autochthonous language and as such, he makes no reference to Star Trek anywhere on his web page. Despite the fact that Star Trek is not mentioned, the site will be of interest to fans of the show, and they will link to it. Thus, the Klingon page will be part of a Star Trek group. If I run a query like "Star Trek alien language resources," the string match with the Klingon page is fairly poor, as two of the significant words do not appear on it at all. However, the group-identifying search engine might still be able to return it as a relevant document, because it is part of a group of pages that feature the words "Star" and "Trek" with overwhelming frequency.

In both of these examples, the search engine has used links to infer human judgments of relevance. In the first case, the program could guess that a page that was not part of a Star Trek group was not relevant to a query seeking Star Trek information. In the second case, the program could guess that a page included in the Star Trek group was relevant to Star Trek queries, despite the fact that the name of the show did not appear anywhere on the site.

Perhaps the most dramatic way to see the power of such a search engine is to imagine how it would stand up to Spammers. A Spammer is an author of irrelevant web pages—usually advertising—who would like his or her

irrelevant documents returned at the top of search engine rankings. The authors of search engines, meanwhile, want to do everything they can to keep Spam out of their results; if they return too much Spam, people will stop using their service. The basic tension, then, is that the engine authors want to return the most relevant documents possible, while the Spammers wish to have their own, useless documents returned. According to Dreyfus, "the ongoing war between the search-engine designers and the Spammers" illuminates the hopelessness of the searching situation (p. 94). He suggests that the search engines are at a disadvantage because they cannot understand the contents of the documents they index and thus, they will always be vulnerable to the cleverly innovative tricks of human Spammers.

Clever tricks or not, a search engine that could identify groups of web pages would have an insurmountable upper hand in the Spam war. Because no legitimate web site would intentionally link to a Spam page, Spam pages could only have outgoing links, or incoming links from other Spam pages. In this situation, a clear differential between internal and external links could be identified—Spam pages could be well-linked to one another, but not to authentic documents with meaningful content. Thus, a node of Spam would be recognized. The whole node would then be considered irrelevant to any query. This search engine would be extremely difficult for the Spammers to defeat. No matter how inviting the content of the page might appear after a simple syntactic analysis (for instance, some Spam pages accomplish this by including hundreds of bogus keywords), if it is recognized as Spam by the human beings who write web pages, it will not be linked; it will be relegated to a node of Spam, and ignored by the search engine.

The conclusion of all of this is that hyperlinks are not only markers of human judgements of relevance, but they are also readily recognized and processed by search engines. They are machine-readable relevance judgements. Thus, hyperlinks will allow search engines to piggyback on human judgements of relevance, greatly improving the quality of search results. Once search engines successfully exploit the meaning in links, the archiving of documents on the Internet might usher in a future considerably rosier than the one Dreyfus fears. It would be a future in which we had access to the undeniably relevant aspects of things, and the undeniably relevant relationships between things, that have been systematically obscured by hierarchies.

References

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[1] Thanks to Hubert Dreyfus, for discussing some of these issues with me, and to Iain Thomson, Mark Stoner, and Gabriel Gryffyn for their comments on an earlier version of this paper.

[2] The only search method that could undercover the euglena in this hierarchy is one that goes to every node in turn and asks the question "do any of the things in this node self-propel?" But such a method of searching renders the hierarchy useless.

[3] Taxonomists eventually addressed the problem of the euglena by creating a new kingdom, Protista, which is essentially a dumping ground for small things that aren't quite animals, and aren't quite plants. The creation of this new kingdom has resulted in a host of new difficulties for the taxonomist. This illustrates an important point about classifications that are this complex: changing the hierarchy to address one set of problems tends to create a new set of problems.

[4] "Big" or "strong" AI, as opposed to "weak" AI, is artificial intelligence that attempts to fully replicate the mental abilities of human beings. Weak AI, a more recent endeavor, has largely sprung up from the ashes of strong AI's spectacular failure. Weak AI attempts to create a machine that is very good at a single, clearly defined task, such as playing chess. In order for search engines to be able to read and understand the documents they index, they would have to be dramatic examples of strong AI.

[5] According to Dreyfus, the central problem facing computers is that they don't have bodies. Without bodies, they cannot acquire the vast amounts of common sense knowledge that humans naturally accumulate through the trial and error experiences that necessarily follow upon being a living being. This sort of knowledge is as basic as: "when [George Washington] was in the Capitol, so was his left foot, and that, when he died, he stayed dead" (p. 16). Without this body of knowledge, a computer cannot hope to understand anything that was written which assumes it, i.e., anything ever written by a person. But the size of this body of common sense knowledge is inconceivably large, so to make it explicit and program it into a computer seems impossible.

[6] http://www.google.com

[7] See http://www.google.com/technology/index.html for a very brief overview of Google's page ranking method.

[8] "Isolated" only in the sense that it is isolated from the Star Trek group. It may well be linked in to any number of other groups, with different areas of focus.

[9] Klingon is a fictional language, spoken by the alien race of the same name in some Star Trek television shows and movies. The linguist Marc Okrand developed its syntax and vocabulary in 1984.

Techne, Technology and Tragedy

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Introduction

This paper is an attempt to highlight some of the similarities and differences between ancient *techne* and contemporary technology within the context of tragedy. First, through an analysis of Thucydides' *History of the Peloponnesian War* and Sophocles' "ode to man" from *Antigone*, I show that the idea of complete technical control that we might only associate with contemporary technology is available in ancient conceptions of *techne*. However, I also show that, quite unlike current conceptions of technology, the ancients recognize things such as disease, natural disaster, and the wrath of the gods as limitations on complete technical control or the unrestrained application of *techne*. For the ancients, there is necessarily a tragic sense to all technical knowledge. Second, in reaction to Heidegger's appeal to recapture the original essence of *techne*, I suggest that if we were now to try to place limits upon, constrain or confine technology or if we were to try to return to a more ancient way of making and living with technical products, then we would also have to recapture or renew our lost connection with the tragic.

Altogether, this essay presents a third way to understand the difference between *techne* and technology outside of the usual "quantitative" and "qualitative" analyses. It may also serve as a sober realization for larger social and/or philosophical considerations of technology because it suggests a paradox: efforts to avoid dehumanizing technology might also require a return of tragedy.

Techne and Technology

Before engaging Thucydides and Sophocles, I will define and compare *techne* and technology more thoroughly because their meanings are neither clear nor univocal.

Generally, the ancient Greek word "*techne*" is translated as "craft" or "art" but also "knowledge". Of these definitions, "knowledge" seems best. "Craft" places emphasis on the finished product of an artisan or craftsman where *techne* really implies the knowledge by which those products were created. The same could be said for "art". However, just plain "knowledge" does not suffice because it applies to other terms such as *episteme*. While sometimes

used interchangeably, *episteme* means "scientific knowledge" and *techne* means "technical knowledge". Where *episteme* may be "knowledge for the sake of knowledge", *techne* is instrumental or oriented towards the deliberate production of something.[1] Furthermore, not only are products wrought via *techne* different from things produced by nature (*phusis*) but also from things produced by chance (*tuche*). So, *techne* is best translated as "technical knowledge" because it gives the specific sense of knowledge directed toward the production of something without confusing that knowledge with the product itself.[2]

Contemporary technology, on the other hand, most often refers to the product itself, instruments and machines (i.e. the computer *is* technology). However, the earliest uses of the word still describe a knowledge or systematic study of the arts (e.g. metalworking) rather than the products of that knowledge. So, at least by these definitions, *techne* and technology are quite similar if not the same.

However, it goes without saying that there are many things that distinguish the products of ancient *techne* from those of contemporary technology. The meager crafts of the ancient blacksmith and cobbler, for example, are hardly comparable to the computers and genetic engineering of today's technologists. This said, quantitative interpreters of technology do not find any essential difference between these two ways of making. In fact, they do not accept the distinction between *techne* and technology at all and instead present contemporary technology as the result of the accumulation and development of earlier, more primitive technologies. A good example of this quantitative distinction is the claim of anthropologists that such things as the stone chip spears or flints of early humans are the foundations for later and more complicated technologies. This type of interpretation is also available in other scholarly and academic approaches to technology. A. Emerson Wiens, a professor of Industrial Technology, begins his "Timeline of the Science and Technology Events Leading to Genetic Engineering" with the making of beer in Babylon at around 5,000 BC (1999). Dudley Shapere, from a philosophy and history of technology perspective, tries to apply an evolution theory normally associated with biology to the development of technology and declares that technology is as old as humankind (1998). Similarly, the International Technology Education Association, made up of technology educators, developers, administrators, academics, and corporate managers, points out that, "Technology has been going on ever since humans…harnessed fire, or dragged a stick across the ground to create a furrow for planting seeds, but today it exists to a degree unprecedented in history…Furthermore, technology is evolving at an extraordinary rate, with

new technologies being created and existing technologies being improved and extended" (2000, p. 2). This suggests that not only are present technologies the accumulated product of earlier advances but that future technologies will result from the continuation of that same process.

On the other hand, many contemporary theories of technology argue that there is in fact an essential or qualitative difference in the characters of *techne* and technology. The Canadian philosopher George Grant's suggests that ancient *techne* had a limited role whereas technology is characterized by its complete lack of limitation (1986, esp. p. 11-13). Along the same lines, Stanley Rosen argues that *techne* is defensive whereas technology is offensive (1993, p. 73). Arthur Melzer proposes that rather than simply bringing something particular into being that would not have existed otherwise, as with *techne*, technology seeks to control nature as a whole (1993, p. 299).[3] For these thinkers, contemporary technology is not simply more complicated or of a greater scope and size than ancient *techne* but is fundamentally different.

Yet, as I will next show, Thucydides *History of the Peloponnesian War* and Sophocles' "ode to man" from *Antigone* clearly show that ancient *techne* strives to overcome the harshness of nature as a whole, is large in scale, offensive, and vast in its effort to control the "tireless," "unwearied" earth. If *techne* and technology share these characteristics, then the qualitative distinctions made just above are not acceptable. But, neither are the quantitative distinctions. Despite the similarity of scope and size of the technical achievements in Thucydides' history and the ode to contemporary technology, they ultimately fail to challenge successfully the primacy of nature (*phusis*) where technology succeeds. Unlike the enduring and permanent character of technology, both texts present ancient *techne* as fleeting, temporary and, as it will be explained, tragic.

Thucydides

Thucydides' *The History of the Peloponnesian War* is good illustration of both the great technical prowess of the ancient Greeks as well as the relationship between *techne* and the tragic. In Book I, the Corinthians explain to the Spartans,

> And it is just as true in politics as it is in any art or craft: new methods must drive out old ones. When a city can live in peace and quiet, no doubt the old-established ways are best: but when one is constantly being faced by new problems, one has also to be capable of approaching them in an original way (1.71).

Here, they are trying to convince the Spartans that, in the same way a craftsman must develop and adopt new methods to improve the quality and efficiency of his craft, their political leadership must find new methods to run their city and empire. They also warn that, if they fail to keep up with technical innovations, Sparta will be eclipsed and taken by a foreign power, Athens. They counsel, "An Athenian is always an innovator, quick to form a resolution and quick at carrying it out," whereas you, the Spartans, "…are good at keeping things as they are…" (1.70-1). So, "new methods must drive out old ones" and tradition must be sacrificed to innovation.

Yet, in the same book, the Corinthians also explain, "…war is certainly not one of those things which follow a fixed pattern; instead it usually makes its own conditions in which one has to adapt oneself to changing situations" (1.122). We might take this to mean that war demands innovation, new skills, contrivances, and arts while old thinking, ways, and traditions must be altered or left behind. However, it really means that because it does not follow a "fixed pattern" and "makes its own conditions", one can only have success in war for so long. There is a strange inevitability to the clash of Sparta and Athens that is beyond the power of either party to stop. As Thucydides concludes, "What made war inevitable was the growth of Athenian power and the fear which this caused in Sparta" (1. 23).

With this in mind, the war is an illustration of the success and power of the technical innovation of ancient peoples but also of *techne* as an invitation for the destruction or violence of nature. Although the conflict between Athens and Sparta is clearly its main subject, the violent movement of nature is the undercurrent of Thucydides' account. In a sense, nature is the third major combatant of the war.

For example, when the Peloponnesians are unable to overcome the innovative defences of the Plataeans, they try burning down the city and "produced such a conflagration as had never been seen before, or at any rate greater than any fire produced by human agency...comparable to one of the great forest fires on the mountains which have broken out spontaneously…" (2.77). But, despite the size and power of their effort, "a thunderstorm with a heavy fall of rain" puts the fire out. In another instances, a series of huge earthquakes turn back the Peloponnesians from an invasion of Attica. A tidal wave is triggered "which covered part of the city and left some of it still under water when the wave retreated, so that what was once land is now sea" (3.89). The best example of the destructive movement of nature is the plague at Athens. Importantly, it was the very innovative character of the Athenians

that brought the plague to them in the first place: "The plague originated, so they say, in Ethiopia in upper Egypt…In the city of Athens it appeared suddenly, and the first cases were among the population of Piraeus…" (2.48) Piraeus is the port city from which all Athenian trade and commerce centers. The disease, like the wealth of the city, came from the effort to destroy and conquer. Thucydides writes, "At the beginning the doctors were quite incapable of treating the disease because of their ignorance of the right methods…Nor was any other human art or science of any help at all" (2.47). The experts, the doctors, are unable to stop the disease and are themselves struck down. The plague is described as "beyond the capacity of human nature to endure" (2.50) and "so overwhelming that men, not knowing what would happen next to them, became indifferent to every rule of religion or of law" (2.52).

These three examples highlight how the war drove both the Athenians and Spartans to greater and greater technical heights. In each case, the unprecedented increase in human technical prowess is matched by the increase of nature's power. So, when in Book VI, the newly named commander, Alcibiades, asserts, "Remember, too, that the city, like everything else, will wear out of its own accord if it remains at rest, and its skill in everything will grow out of date; but in conflict it will constantly be gaining new experience…" (6.18) he is partly right. Yes, cities and men "wear out" on their own accord. But, as shown above, technical innovation does not change this certainty. Instead, the lesson is that the greater attempt to control nature, the greater the destruction. After all, the Sicilian Expedition that Alcibiades promotes in this same speech demanded all of the skills, equipment, and know-how of Athens but also led to the collapse of their empire.

Sophocles

While there is little doubt that we have been quite successful transforming (both human and non-human) nature into a resource, Thucydides' history indicates that there was no lack of effort on the part of ancient peoples to do the same. This is also the message of Sophocles' the ode to man (332-375).[4] In this first stasimon, the chorus sings of a world dominated by technical knowledge and its terrible consequences. They describe a place of constant creation and destruction—always innovating and driving forward, made by man but inhospitable and inhumane. The first three passages of the ode are a history of the technical evolution of man: i) inanimate nature is conquered; ii) animals are captured and trained to serve; and iii) society is ordered and cities are built. At each stage, man's control of nature expands. But, the

fourth and last passage marks an unexpected turn. Now, technical achievement is described as beyond expectation. *Techne* is revealed to be outside of human control — it produces things "beyond our hopes."

Stage 1: inanimate nature is conquered

The first line of the ode describes man as *deinos* or wonderful: "Wonders are many, and none is more wonderful than man." James Nichols highlights the multiple meanings of *deinos* in his translation, "Many are the things that are *deinos* [terrible, awesome, uncanny, clever], and nothing is more so than man" (1993, p. 30).[5] Being *deinos*, then, is not really praiseworthy but rather an expression of a certain power or capacity. The chorus portrays man as the most dreadful, clever, and resourceful thing in all of the world.[6] He is different. He stands out.

The remainder of the passage describes how "wonderful" man "wears away" three characteristics of the earth: the eldest (*hupertatan*), the immortal (*aphthitos*); and unwearied (*akamatos*).[7] *Hupertatan* implies both age and place or position. So, the ode describes how man destroys the old or given order to create something new that he leads and controls. *Aphthitos* literally means against "*phthino*," against decay. Man begins the degeneration of the earth. A similarly literal translation of *akamatos* gives us "without a sense of toil." By itself, *kamatos* implies sickness, pain, or tiredness and *kamno* means "to work." To overcome *akamatos* man works and toils (*kamnos*). He wears away (*apotruetai*) the soil as in *gen apotruesthai*, to vex constantly the earth by working it.

By the end of the first stage we are told that the development of agriculture has come at a great cost: the toppling of the natural order and the degeneration of the earth. This difficult give and take is the invariable result of all technical achievements.

Stage 2: animals are captured and trained to serve.

Man's conquests over the animals can be divided into two groups: i) those of which the primary aim is to kill or to capture—man uses nets for fowling (*ornithon*), hunting (*theron*), and fishing (*pontou phusin*); ii) those conquests which aim at reducing wild animals to man's service.[8]

In the first set of conquests, there is a new definition of man. He is not just *phrades*, shrewd, but has *periphrades*, an all around shrewdness. We might relate the "all around" nature of man's thoughtfulness, to Nichols' discussion

of *panourgia* meaning criminal or rogue. Literally meaning the temperament to do everything, *panourgia* suggests that when a citizen recognizes no limits, conventions, or laws he is a criminal. In a similar sense, the first conquests characterize human thoughtfulness as unbounded.

This carries onto the second set of conquests and a third definition of man. He is master or conqueror (*kratei*). Now, he is not simply the hunter of animals, but their master. Importantly, this mastery is achieved with *mechanai*, devices. *Mechanais* is from *mechos* which is "means, expedient or remedy" but also an instrument or machine for lifting weights. The devices, then, imply strength or, better yet, a remedy for inherent weakness. This is clear in his use of the yoke to tame *akmeta tauron*, the untiring mountain bull. Where before he was fearful or at the mercy of the bull, he now controls it. In this second stage, man becomes dependent on devices and mechanisms to maintain his control of beasts. Thus, the themes introduced in the first stage continue—the "untiring" is taken hold of, controlled, strapped down.

Stage 3: society is ordered and cities are built

Next, man teaches himself speech and has *astunomous orgas*, "the temperament to build and rule cities." Aristotle describes a similar relationship between language and the development of cities, "…language serves to declare…what is just and unjust...and it is association in [a common perception] of these things which makes...a *polis* (1958, II, ii, 11-12). But, the emphasis in the ode is different than in Aristotle's presentation. Rather than a natural impulse, the ode presents the temperament to build and rule cities as wrought out of man's dire situation: he is subject to the cold frost of winter and the lashing of rain. Hence, the city is not part of a natural progression or expression but an escape (*pheugein*).

For this, man is all-inventive (*pantoporos*). This new description fits well considering that *poros* refers to an artificial passage over a river, a bridge. So, the city is as a bridge going everywhere (*pan*), an artificial escape. This interpretation is warranted as the next line begins with the word *aporos* meaning without passage, as in when man does not have resources he can do very little. The one thing that man is unable to do, no matter what his resources, is *Haida pheuxin*, escape death. Inventiveness is clearly associated with escape: man can escape most of nature but not his own death.

Still, he delays death. He has escaped from disease or plague (*nosos*) with medicine. The last line of the third stage explains that these diseases were before *amechanon*, without device or resource for their remedy. We could

take this to mean that man's devices (*mechanon*) overcome *amechanon* in same way his work (*kamno*) overcame the "without work" (*akamatos*) earth or the way the yoke "tires" the untiring mountain bull in the first half of the ode. Now, human life itself is dependent on devices and medicines.

Stage 4: technical achievement beyond expectation

At this point, the history of technical achievements has concluded. In the fourth stage, man is cunning (*sophos*) in his craft (*mechanoen*). With his ingenuity, intelligence, and understanding he devises arts (*technai*) of a measure above or beyond (*huper*) expectation (*elipida*). For the first time it is suggested that technical knowledge (*techne*) is not necessarily under the steadfast control of humans. Instead, *techne* can produce either the bad or the good, the base or the noble, destruction or greatness. As the first three stages describe, man destroys the existing barriers to his activity: the earth, the beasts, the elements, and disease. Now, his inventiveness has almost no limit.

The chorus now warns, "When he weaves in the laws of the land, and the justice of the gods that binds his oaths together he and his city rise high — but the city casts out that man who weds himself to inhumanity thanks to reckless daring."[9] Only when man "weaves" divine and natural law into its texture, will the city foster human health, virtue, and happiness. The ode introduces weaving as remedy for the equivocal, paradoxical and amoral character of man's technical achievements. He progresses out of nature, is freed from the harshness of the elements, only to be subsumed by his own innovation. The chorus is suggesting a solution. Weaving natural law and divine justice into the texture of the city restores a limit or a boundary to human innovation while still allowing for an escape from the harshness of the natural elements. But, it seems odd that a weaver is called upon to repair damage done by earlier craftsmen. How is the weaver different from the sailor, farmer, hunter, and city builder mentioned in the first three passages of the ode?

The last lines of this passage provide something of an answer. The chorus hopes that good judgement (*phroneo*) will never be same (*ison*) as the thoughts of these craftsman. They do not want their judgement clouded by technical knowledge (*techne*) or, in a more general sense, technical knowledge should never be the same thing as or equal to (*ison*) good judgement. So, rather than *techne*, the weaver has good judgement. This is the character of our weaver rather than the cleverness, inventiveness, and cunning of the earlier craftsman. It remains unclear whether this is a new skill that man must learn or an old skill he must develop. The danger, however, is clear: when

good judgement is understood as technical knowledge, man is set for destruction—by his own hand, natural disaster, or the wrath of the gods.

This is the very thing that seals the fate of Creon, the new king of Thebes. He conceives of the city as a refuge from nature (Sophocles 1984, 189) and the citizenry as malleable matter to be moulded as he sees fit (293, 476-478, 569). Antigone, however, is portrayed as a force of nature (423-425, 712-717, 825-830), unwilling or unable to conform to his rigid rule. While the audience takes Antigone as the heroine and her uncle Creon as the villain, the ode to man cautions that neither of these extremes make for a good city or a good life but the need for a harmony or balance between them. To say the least, this is a lesson taught at a great price: lives lost and forever ruined.[10]

This is also a lesson common to many ancient works. The stories of Achilles, King Midas, Oedipus and many others remind us that there are tragic limits to human knowledge and activity. While the characters in these epics and tragedies dream and strive to win control of their fates, they all eventually learn that human beings are wrapped up in the enigmatic and unpredictable character or power of the natural world.

Heidegger

The return of this tragedy is a recurrent theme in eighteenth and nineteenth century German philosophy. For example, in the preface to *The Birth of Tragedy*, Friedrich Nietzsche explains that his study of tragedy is a "grappling with a crucial German issue—an issue situated at the very center of our hopes and aspirations" (1999, p. 16). In other words, for Nietzsche, a discussion of ancient tragedy is no mere historical or academic exercise but of great relevance to his present age. So, Martin Heidegger is certainly not the first philosopher to call for a return of the tragic. However, unlike his predecessors, Heidegger links tragedy and technology. He argues that because technology "enframes" the planet and everything on it we become cut off from an awareness of tragedy: the originary strife, the enigma of suffering, the transience or "movedness" of all nature including our own. As is evident in Thucydides and plays such as *Antigone*, the Greeks were aware of the essential place of the tragic in their daily lives and communities. It is this awareness that Heidegger wanted to recapture. It is not so much that technology eliminates tragedy but the fact we are unaware that tragedy is a defining characteristic of human existence even in the technological age.

Below, I will highlight why Heidegger argues that, because it is connected to the tragic, a return to ancient *techne* might serve as a response to the

enframing essence of technology. My intention here is not to discuss the larger place of tragedy in Heidegger's work. This has already been taken up by Reiner Schürmann (1993; 1994), William McNeill (1999), and Dennis Schmidt (2001). Nor do I intend to add to the already considerable scholarship on Heidegger's analysis of technology. While I will rely on literature from both of these areas and refer to these subjects, I intend to focus on Heidegger's idea that ancient *techne*, specifically pre-Platonic *techne*, engenders an awareness of the tragic whereas contemporary technology denies this awareness.

In Heidegger's interpretation of the ode to man in *Introduction to Metaphysics* (2000, 156-176), he flatly dismisses the quantitative view that the ode represents man's accumulation of technical prowess, isolation from or movement out of wilderness and into civilization. Instead, he explains it as an expression of the original relationship between man, technical knowledge, and nature. For him, sailing, hunting, and city building are not the beginnings of a control of nature or man's isolation from nature but rather the places or "scenes of disclosure" for the breaking in of the overwhelming (2000, 174).[11] That is to say, without sailing there could be no overwhelming force of the sea, without hunting there could be no overwhelming pain of hunger, and without the city and empire there could be no overwhelming force of war. As suggested above, the same analysis applies to the relationship between violence, disaster, destruction and Hellenic technical prowess depicted in Thucydides' account of the Peloponnesian war. We could also take the great wall of the Achaean's in Homer's *Iliad* as another example of this type of *techne*, "Built against the will of the immortals, The wall could not endure for long" (Book 12, line 10-11). The powerful wall is built only to be overpowered by the gods. It was built only to be destroyed and thus reveal the power of the gods. Clare Pearson Geiman explains that "Human activity as *techne*, then, is caught in a paradoxical necessity. On one hand, it must order the possibility and standards of justice and governance on a human level. On the other, it must respond to a higher ordinance that compels the continual destruction and reforming of such orders" (2001, p. 171). In other words, all forms of *techne* are caught in a tragic paradox – the technical imposition of order is the spur for the renewal of disorder.

In "The Self-Assertion of the German University," Heidegger calls this relationship between man, technical knowledge and nature "the original Greek essence of science" (1990, p. 473). While modern science is understood normally as a means to transform nature to serve human ends, Heidegger argues that the original Greek essence of science reminds us of our tragic impotence in the face of nature. While the *technai* discussed in *Antigone*, and

likewise those discussed by Thucydides, may allow a freedom from of mastery of nature's dynamic influence, there is no suggestion it is enduring. Far from it, it is a freedom that is fated to be unmade.

According to Heidegger, where ancient *techne* was a scene of disclosure for overpowering nature, contemporary technology invites no such disclosure. Put differently, the distinction between *techne* and technology is found in the difference between temporary and permanent imposition. This is why Heidegger celebrates pre-Platonic technical knowledge and laments the instrumental rationality of technology.

This division is discussed in somewhat clearer terms in *The Question Concerning Technology*. There, the ancient craftsman's art is described as a "bringing-forth", a working in partnership or co-operation with the nature of materials to construct an artifact, such as a chair or a house, while the contemporary technologist is described as "challenging-forth" or changing the nature of materials to make them stronger, more flexible, longer lasting, etc. For example, a doctor may "bring forth" the already available health of an individual through medicine whereas cloning or genetic engineering "challenge" the natural bounds of the body creating a wholly new "artifact" with different characteristics. As Heidegger details, earlier human inventions did not permanently impose a new form onto nature. Under normal conditions, because the material of an artifact was still bound by natural characteristics, nature would always "shine through" the imposition of the artist, craftsman or technician. A carpenter imposes the form of a chair onto wood but once the chair is finished that wood still maintains its natural characteristics to rot and decompose in the same way a fallen tree rots and decomposes on the forest floor. In other words, the craftsman's chair is a site of openness for the revealing of nature. And, because this revealing comes through an artifact, it is all the more stark and tangible. The rotting of our chair or our house is more significant to us than the decomposition of a dead tree.

In contrast, we might look to the growing list of contemporary technologies that do not co-operate with nature but attempt to replace it. A nuclear engineer can manipulate the structure of natural elements to produce artificial elements. Plutonium, for example, is designed to never abide by or return to the characteristics of the uranium from which it was derived. The character of plutonium (i.e. its level of radioactivity) is always artificial. Likewise, the genetically altered human is designed to never return to the natural characteristics of the material from which it was derived (e.g. a sick or weak body) and thus is always artificial.[12] In turn, contemporary technological artifacts do not disclose nature. And, because in a technological society so

much of our world is filled with these "undisclosing artifacts", we are cut off from, become unaware of, or forget the essential movedness or transience of existence. As Heidegger writes, "Enframing blocks the shining-forth and holding-sway of truth" (1993, p. 333).

But, why or how was this awareness lost? Heidegger describes how Platonic emphasis on the enduring and permanent character of the *eidos* narrows our conception of and relationship to nature (*phusis*). While I cannot in the short space of this essay explain the complexities of Heidegger's interpretation of Plato, I think it would be helpful to summarize his basic argument.[13] In *Introduction to Metaphysics* he asks, "But if that which is an essential *consequence* is raised to the level of essence itself, and thus takes the place of the essence, then how do things stand?" He continues, "What remains decisive is not the fact in itself that *phusis* was characterized as *idea*, but that the *idea* rises up as the sold and definitive interpretation of Being" (2000, p. 194). Heidegger explains that the idea or *eidos* is initially understood as the visible appearance of the "movedness" or "emerging power" of nature (*phusis*). In this way it is only a mere consequence of nature. However, Plato's "theory of ideas" comes to exalt the merely visible and, thus, "The visage offered by the thing, and no longer the thing itself, now becomes what is decisive" (2000, p. 195). From here, *phusis* as movedness is ignored in lieu of the superficial, unmoving *eidos*. *Eidos* becomes a *paradeigma*, a model or prototype rather than anything immediately apparent. Heidegger concludes, "Because the actual repository of being is the *idea* and this is the prototype, all disclosure of being must aim at assimilation to the model, accommodation to idea" (1959, p. 185).[14] Therefore, according to Heidgger, Plato's metaphysics contextualizes all knowledge as instrumental.

Under the reign of metaphysics, *techne* comes to express an effort to isolate things thought and made by humans from the influence of nature rather than being sites of openness or scenes of disclosure for overwhelming or overpowering nature. Now, *techne* no longer reveals nature but instead narrows it to raw material waiting for technical transformation. According to Heidegger, this turn lends itself to modern science, the objectification and manipulation of nature, technological thinking or "enframing" (*Ge-stell*). Where before *techne* could only toss man "back and forth between structure and the structureless, order and mischief, between the evil and noble" (1959, p. 161)[15] as described in *Antigone* and other ancient works, it could now transform, assimilate and accommodate the world to the model or prototype (i.e. the *eidos*).

From this point, the essence of technology begins to reveal itself as

something akin to contemporary technology. Although, there are still no "technologies" as such, the perspective by which technologies manifest has been established. It is simply a matter of time between the most basic products of instrumental thinking and global technology. For Heidegger, technical knowledge or *techne* is "a process of reflection" (1993, p. 218) that transforms the world because, through it, existence is assimilated to the technological model.

How then does Heidegger understand a return to ancient *techne* possible? How does he propose we overcome Plato's metaphysics? The answer can be found in the Rectoral address. He says, "The beginning exists still. It does not lie behind us as something long past, but is stands before us...The beginning has invaded our future; it stands there as the distant decree that orders us to recapture its greatness" (1990, p. 479). He includes a controversial translation of line 497d9 of Plato's *Republic* at the end of the address: "All that is great stands in the storm..."[16] Altogether, this suggests that our thinking, our building, our politics, and our art must be *episphales* (prone to fall and precarious) — not to protect against or hide from the collapse and confusion of Western metaphysics and the resulting civilization but to be scenes of disclosure, to usher in destruction as preparation for a "new beginning." Bear in mind his quotation of the words of Prometheus earlier in the same speech, "'But knowledge (*techne*) is far less powerful than necessity.' That means: all knowledge of things remains beforehand at the mercy of overpowering fate and fails before it" (p. 472). Heidegger's appeal to the fleeting and tragic character of technical knowledge suggests that we need not be beholden to any of the static traditions or institutions of contemporary science. Instead, he wants us to move away from an emphasis on the permanent imposition of form onto matter associated with technology toward the fleeting and tragic character of this *techne*.

Schmidt explains that Heidegger viewed tragedy as "the counterforce" to the stultifying affect of technology:

> Part and parcel to this call for a new beginning, for an overthrow of presumptions of metaphysics, is the sharp critique which is leveled against the final forms which metaphysics has taken: the reign of values and the ascendance of technology . . .Greek tragedy will provide the counterforce to this metaphysical sense of the elemental character of human being since...it will present a view of human being as fundamentally strange, as the opening to an abyssal and inconceivable freedom (Schmidt 2001, p. 240).

In the 1930s, Heidegger seemed to think that a return to tragedy required an immense planetary wide effort on the part of the German *volk*. He writes:

> Russian and America, seen metaphysically, are both the same: the same hopeless frenzy of unchained technology and of the rootless organization of the average man...The spiritual decline of the earth has progressed so far that people are in danger of losing their last spiritual strength, the strength that makes even to see the decline [which is meant in relation to the fate of "Being"] and to appraise it as such (2001, p. 40).

In saying this, Heidegger is arguing for a violent response "to recapture, to repeat" an existence unencumbered by the influence of technology. Indeed, it is fair to say that this aspiration led Heidegger to actively support National Socialism in the belief that it could destroy both the Russian and American forms of democracy which he described as political manifestations of technology and the legacy of Western metaphysics. As he explains in the *Der Speigel* interview of 1966, "At that time I saw no alternative."

Here, tragedy as counterforce took the form of world war. However, the so-called "late" Heidegger seems to move away from this type of violent call. In the same *Der Spiegel* interview, he concludes that now, "Only a god can save us." While this is far more passive then his pre-WW II position, it is no less violent. We need only think of catastrophic plague at Athens, the fates of Creon and Antigone, and the destruction of the Achaen wall, to recognize the violent character of Heidegger's saving god or, as it is described elsewhere, "saving power" (1993, p. 340). Tragedy remained at the heart of Heidegger's understanding of *techne* and technology to the very end.

Tragedy and our current understanding of technology

But, if a return to *techne* necessarily engenders tragic consequences, why should we want such a return?

There is no doubt that technology allows humans to control the harshness of nature and gives us the ability to satisfy our needs and mitigate suffering. However, as is suggested in the ode, when we are completely ruled by techne, we lose all connection to the natural order in lieu of the prescribed order of technical control. Considering this trade off, Martha Nussbaum writes:

> In a time of deep need, feeling that our very survival is at stake, we may turn ourselves over to a new art. Sometimes this art will simply

> do what we ask of it, providing efficient instrumental means to the ends that we already have. Sometimes, however...the art will so deeply transform ways of life that we will feel that it has created a new type of creature. If, then, we contemplate curing our current ethical diseases by a new art, we must imagine, as well, and with the utmost care, the life that we will live with this new art and the aims and ends that go with it. For we may not want a radical solution, if its cost will be to be no longer human. This would hardly count as saving our lives (1986, p. 106).

Without some "cure" human life would be harsh and at the mercy of the natural elements. But, with too much medicine, human life will lose all connection to nature. When left unchecked, our efforts to overcome "inhumane" disease and death result in dehumanization. Of course, this is the paradox of technologies such as genetic engineering. They seem to have unlimited potential to overcome disease and death and yet this cure may be at a cost we are unwilling to pay. Hence, we may choose to embrace strife and mortality over the alternative.

Conclusion

In conclusion, I think my analysis of these two texts highlights how *techne* and technology share the same characteristics. Yet, while ancient peoples may have attempted technical control of the planet and everything on it, their technical knowledge did not hold back the disclosure of nature. While their craftsman may have been able to bring-forth artifacts that would not have come into being otherwise, this was only done with the co-operation of nature. As is well illustrated by the violence of Thebes and the near annihilation of Athens, eventually all artifice, no matter how large, is overpowered or overwhelmed. Technology, on the other hand, does not work in co-operation with nature. Rather than being a scene of disclosure for overpowering nature, technology challenges nature, imposing a permanent form onto matter. It does not allow nature to "shine through" it. *Techne* and technology are distinguished in this way.

However, because we have overcome many of the traditional limitations on technical control and, therefore, have become disconnected from an awareness of the tragic, when technology does move toward dangerous and harmful ends, we have little idea of how to respond. Because there are fewer and fewer limits to technology, it seems to us unlimited, all encompassing, out of control, autonomous and thus different from ancient *techne*.

Obviously, we cannot expect the pantheon of ancient Greek Gods to rain down thunderbolts and stir up tidal waves to knock back the hubris of our making. At the very least, we should consider whether it is necessary to sacrifice what we have been given with what we will make.

Appendix 1:
Sophocles' "ode to man" from Antigone

[332] Wonders are many, and none is more wonderful than man. [335] This power spans the sea, even when
it surges white before the gales of the south-wind, and makes a path under swells that threaten to engulf him.
Earth, too, the eldest of the gods, the immortal, the unwearied, [340] he wears away to his own ends, turning
the soil with the offspring of horses as the plows weave to and fro year after year.

[343] The light-hearted tribe of birds [345] and the clans of wild beasts and the sea-brood of the deep he
snares in the meshes of his twisted nets, and he leads them captive, very-skilled man. He masters by his arts
[350] the beast who dwells in the wilds and roams the hills. He tames the shaggy-maned horse, putting the
yoke upon its neck, and tames the tireless mountain bull.

[354] Speech and thought fast as the [355] wind and the moods that give order to a city he has taught
himself, and how to flee the arrows of the inhospitable frost under clear skies and the arrows of the storming
rain. [360] He has resource for everything. Lacking resource in nothing he strides towards what must come.
From Death alone he shall procure no escape, but from baffling diseases he has devised flights.

[365] Possessing resourceful skill, a subtlety beyond expectation he moves now to evil, now to good. When
he honors (weaves) the laws of the land and the justice of the gods to which he is bound by oath, [370] his city prospers. But banned from his city is he who, thanks to his rashness, couples with disgrace. Never may he share my home, [375] never think my thoughts, who does these things!

Sophocles' "ode to man" from *Antigone* (Latin transliteration)

polla ta deina kouden anthrôpou deinoteron pelei.
touto kai poliou peran pontou cheimeriôi notôi 335

chôrei, peribruchioisin
perôn hup' oidmasin.
theôn te tan hupertatan, Gan
aphthiton, akamatan, apotruetai
illomenôn arotrôn etos eis etos
hippeiôi genei poleuôn. 340

kouphonoôn te phulon ornithôn amphibalôn agei
kai thêrôn agriôn ethnê pontou t' einalian phusin 345
speiraisi diktuoklôstois,
periphradês anêr:
kratei de mêchanais agraulou
thêros oressibata, lasiauchena th' 350
hippon ochmazetai amphi lophon zugôn
oureion t' akmêta tauron.

kai phthegma kai anemoen phronêma kai astunomous 355
orgas edidaxato kai dusaulôn
pagôn hupaithreia+ kai dusombra pheugein belê
pantoporos: aporos ep' ouden erchetai
to mellon: Haida monon pheuxin ouk epaxetai: 360
nosôn d' amêchanôn phugas xumpephrastai.

sophon ti to mêchanoen technas huper elpid' echôn 365
tote men kakon, allot' ep' esthlon herpei,
nomous gerairôn chthonos theôn t' enorkon dikan,
hupsipolis: apolis hotôi to mê kalon 370
xunesti tolmas charin. mêt' emoi parestios
genoito mêt' ison phronôn hos tad' erdei. 375

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[1] Bloom notes that *techne* is "a discipline operating on the basis of principles that can be taught. It is, hence, not opposed to science but allied with it…(Plato 1968, p. 443, Note 22).

[2] While something could be made of the etymological meeting of *techne* and *logos* (reason) in the modern word technology, the Greek sense of *techne* already implies the application of reason. Aristotle, for example, defines *techne* in the *Ethics* as "a state of capacity to make, involving a true course of reasoning (*logos*)" (Aristotle 1958, 1140a10). Carl Mitcham points to Aristotle's use of the word *technologia* in *Rhetoric*. However, he admits that its meaning is considerably different from the modern word "technology."

[3] Carl Mitcham describes *techne* as "fundamentally oriented toward particulars instead of toward the efficient production of many things of the same kind in order to make money" as is technology (1994, p. 123). See also William Lovitt's "*Techne* and Technology." *Philosophy*

Today (Spring 1980).

[4] See Appendix 1 for Sir Richard Jebb's translation of the ode to man as well as the Latin transliteration.

[5] *Deinos* comes from the root *deos*, meaning fear.

[6] Depending upon the context *deinos* can be any one or all of these things. For example, in Book 12 of Homer's *Odyssey*, *deinos* suggests something dreadful: "[235] For on one side lay Scylla and on the other divine Charybdis terribly [*deinon*] sucked down the salt water of the sea. Verily whenever she belched it forth, like a cauldron on a great fire she would seethe and bubble in utter turmoil, and high over head the spray would fall on the tops of both the cliffs." In Plato's *Apology*, *deinos* implies cleverness. Socrates is described by his accusers as being *deinos legein*, "terribly clever at speaking." And, in Herodotus' *The Histories* (ed. A. D. Godley), it suggests resourcefulness: "5.23. [2] Sire, what is this that you have done? You have permitted a clever and cunning [*denoi*] Greek to build a city in Thrace, where there are abundant forests for ship-building, much wood for oars, mines of silver, and many people both Greek and foreign dwelling around, who, when they have a champion to lead them, will carry out all his orders by day or by night."

[7] Most translations of the ancient Greek are made with the help of Liddell's and Scott's *Intermediate Greek Lexicon*.

[8] This division is made by Sir Richard Jebb's in his *Commentary on Sophocles: Antigone*.

[9] Translated by Robert Fagles. David Grene translates line 368 as "If he honors the laws of earth, and the justice of the gods he has confirmed by oath, . . ." Here, instead of "weaves" (*pareiron*), there is "honors" (*gerairon*). Richard Jebb argues that "weaves" is the proper word. He suggests that the similar *gerairon* came to replace the original *pareiron*. Also see Lloyd-Jones and Wilson (1990).

[10] Creon believed he could individually guide his city through its civil strife but his overconfidence resulted in calamity and sorrow (see especially Sophocles 1984, 1257-1300).

[11] For another discussion of the "the open" see Heidegger (1196, p. 91-92).

[12] For an excellent discussion of the relationship between art, technology, and nature see Glazebrook (2000).

[13] For a thorough consideration of Heidegger and Plato see Partenie and Rockmore (forthcoming).

[14] Here, I rely Manheim's 1959 translation because it more clearly communicates the instrumental aspect of Platonic emphasis on *eidos*. In another consideration of the *eidos*, Heidegger explains that *phusis* no longer "...possesses the unique quality of delivering over to itself that which *through it* is first transformed from something orderable (e.g., water, light, air) into something appropriate for it alone (for example, into nutriment and so into sap or bones)" (1998, p. 227), but is conceived of as raw 'material'." Just as philosophy focuses on the visible, modern science "seizes upon the most extreme non-essence of fusis and inflates it into the real and only essence" (1998, p. 228). So, Plato's articulation of metaphysics marks a fundamental turn away from the tragic relationship with nature expressed in pre-Socratic sources.

[15] Again, I rely on the Manheim translation.

[16] Allan Bloom translates the same line as "For surely all great things carry with them the risk of a fall, and, really as the saying goes, fine things are hard." There is no mention at all of a "storm."

The Moral Designer

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Whitbeck, Caroline. *Ethics in Engineering Practice and Research*. Cambridge: Cambridge University Press, 1998, pp. 330.

Introduction

The rise of applied and practical ethics as a field in philosophy has created a need to give answers to concrete moral problems. There is, however, no consensus about what ethical theory (utilitarianism, deontologism, virtue ethics etc.) should be adopted. Moreover, most ethical theories seem to be disconnected from cases. Thus the question what role ethical theories should play in moral practice is one of the most important issues in applied and practical ethics now (Clark & Simpson 1998; Rosen 1988).

Some have tried to rebuild existing ethical theories in order to be better applicable to cases. For example, Beachamp and Childress have constructed a theory of *prima facie* principles specifically aimed at dealing with moral questions arising from biomedical practice (so called[1] 'middle-level' moral principles). Beachamp and Childress maintain that the process of moral deliberation should be a rational one consisting of arguments that are backed up by justified principles embedded in a coherent ethical theory (Beachamp & Childress 1989, p. 6-7).

Other authors have tried to develop a methodology that enables us to integrate demands from (different) ethical theories with demands that follow from professional standards and social conventions. Harris, Pritchard, and Rabins, for example, have tried to sketch a possible outline of such a meta-theoretical framework in which a wide range of moral demands can be taken into account at once. Using what they call the 'line drawing' technique, answers to moral questions can be judged on several continuous scales. The task of the moral agent is to locate possible responses to a moral problem on those scales, and to identify the best possible configuration of positions on this, what I would call, 'moral equalizer' (Harris, Pritchard *et al.* 2000). They, like Beachamp and Childress, endorse an analytic and rationalistic approach.

Caroline Whitbeck is unsatisfied with these approaches, which she judges to be too rationalistic. She has constructed a *non-rationalistic* theory of moral reasoning. She insists, in her *Ethics in Engineering Practice and Research*

(1998a), that moral problems cannot and should not be viewed as rational decision problems, but should be compared with (industrial or engineering) *design problems*. This, she argues, forces us to adopt a different view of what it means to deal with a moral problem.

I shall argue below that Caroline Whitbeck offers an original contribution to the debate in practical and applied ethics about the role and limits of ethical theory. Focusing on the process of moral decision-making, it allows for a more dynamic approach in practical ethics, and sheds a different light on questions related to the nature of moral dilemmas, and on the question of how to deal with several, seemingly conflicting, demands. Yet, the design analogy still has to be extensively developed, and it is unnecessarily embedded in a confused moral conservative theoretical framework.

Rational foundationalism

Whitbeck's theory can be split into two major parts. Firstly, a defense of her analogy of moral problems with design problems (discussed in the next section). Secondly, a rejection of what Whitbeck calls rational foundationalism, in which the debate about the use (or uselessness) of ethical theory in moral practice, a debate that found its peek in the late 1980's early 1990's (Winkler & Coombs 1993; Rosenthal 1988), is revived. Whitbeck sides with the moral conventionalist or moral conservative camp (terms from Hare 1988; Clarke & Simpson 1998), relying heavily on the work of Bernard Williams, Annette Baier, Alisdair MacIntyre, Stuart Hampshire[2] and Stanley Hauerwas.[3]

Even though Whitbeck is not specific about what she means by rational foundationalism, I take it to be the search of a rational justification of moral concepts through (an) ultimate moral principle(s). This includes, for Whitbeck, normative approaches, such as utilitarianism and deontologism, but also foundationalist meta-ethical approaches. Her criticism, however, specifically targets principalist approaches in applied ethics, such as that of Beachamp and Childress[4]. According to Whitbeck, such approaches fail in moral practice for at least three reasons.

First, rational foundationalism has little to do with moral reality. Whitbeck adopts Annette Baier's criticism on ethical theory that moral philosophy has become "an intellectual, sometimes largely formal, game, a variant of chess" (Baier 1993, p. 132), while not producing anything particularly helpful in dealing with real-life problems. Consequently, philosophers' jargon is far away from the language people use in real life, and the outcome of their work

does not connect with real-life moral experience (cf. Baier 1985, p. 207-227). Whitbeck endorses an approach close to experience, which recognizes the influence of moral tradition and social context on moral terms (Whitbeck 1998b, Parts I & II).

Secondly, Whitbeck objects to the rational foundationalist approach as it suggests that it is possible to formulate general theories and rules first, and apply those to specific social practices later. According to Whitbeck, rules can only be found bottom-up (e.g., rules attached to social and professional roles) as they are subject to change and revision, and acquire their actual content through social practice. As a good alternative methodology, Whitbeck recommends the casuistic approach of Stephen Toulmin and Alfred Jonsen in *The Abuse of Casuistry* (1989). They plead for case-to-case reasoning, which recognizes the historical and cultural embedding of the case at hand, instead of a top-down approach. Whitbeck specifically embraces their view of the agent: an actual agent-judge, employing analogical reasoning from other paradigm cases (Whitbeck 1998b, Part II, 3).[5]

The concept of practice is important to Whitbeck. When Whitbeck speaks of practice, she has a MacIntyrian notion of practice in mind: a distinct, "coherent and complex form of socially established co-operative human activity" (MacIntyre 1984, p. 187). Even though Whitbeck does not adopt the typical MacIntyrian notions of excellence and goods internal to a practice, she does consider a practice to be a domain with its own moral status, which produces its own norms and values. This idea takes its form in her notion of professionalism. Professionals (i.e., engineers) have access to specialized knowledge, which gives them a special kind of insight and responsibility. The activities of these professionals are, however, not easily judged 'from the outside.' Therefore, professionals construct their own professional codes (to be considered as practice-based rules) which should, according to Whitbeck, be taken seriously in their own right, and which form a legitimate input for moral reflection.

Whitbeck's third point is that rational foundationalism, though one possible approach to practical ethics, is certainly not the only one (Whitbeck: 1998b, Part I, 2). When addressing a particular moral problem, Whitbeck argues, an agent can take into account the *whole* spectrum of moral judgments and justifications, and is not limited to just one ethical theory. Thus she claims that "the reflective person engaging in moral reflection need not adopt some foundationalist position nor restrict attention to only a few types of moral reflection" (2; note that this idea is also endorsed by Harris, Pritchard and Rabins). A moral agent should not be forced to choose between theoretical

principles; (s)he can draw from the *whole* moral vocabulary (which includes both utilitarian and deontological principles, as well as, for instance, considerations of care and rules attached to social or professional roles). Note that rule- and principle-based approaches are included in the moral vocabulary, but that this is only so because they are part of the (individualistic, right based) Western moral culture, and not because reason tells us they are (cf. Whitbeck 1998a, 21).

Even though Whitbeck's criticism of rational foundationalism should primarily be read as an indication of her philosophical *background*, some critical remarks are in place here. Firstly, Whitbeck has not really tried to build a coherent theory of her own, but has only pointed out *fragments* of ethical positions she agrees with. Her defense of a moral conventionalist approach and her rejection of rational foundationalism in ethics consist mainly of lengthy quotations of authors she sympathizes with (her position could be seen as the 'common denominator' of these theories). This is defendable, however, given Whitbeck's modest aim to just indicate her philosophical position, and given the fact that the originality of Whitbeck's theory lies elsewhere: in her analogy of moral problems with design problems. More problematic is that Whitbeck's argumentation is sometimes rather imprecise. To name just one example: Whitbeck discards the criticism on MacIntyre that he is unable to show how the ethics of a community or practice could be criticized on the ground that MacIntyre is no communitarianist (Whitbeck 1998b, Part I, 5). As lack of a critical standpoint is a threat not only to communitarianism, but to all moral conventionalist theories, this argument is clearly flawed.

Secondly, as a moral conservative, Whitbeck will have to show *herself* how the ethos of a specific community, or, more appropriately in this context, a profession, can be criticized. The fact that some norm has passed the test of time or is strongly embedded in a social context does not automatically justify that norm. Whitbeck seems to agree with this, as she claims that the sort of relativism springing from theories like those of MacIntyre and Baier (and of Whitbeck herself) does not imply that "an action can be criticized only by the criteria commonly used in that period". For example, "the principle of informed consent only came about around 1940, [but] it *is arguably* a superior standard" (Whitbeck 1998a, 11; my italics). But, even though Whitbeck wants to be able to evaluate moral standards, she cannot tell us *what* arguments could *arguably* be brought up to defend such a claim.

Whitbeck's choice for a strict conventionalist approach makes it hard, if not impossible, to add normative criteria independent from cultural context or a

specific period. As I shall try to show below, this weakens her thesis about ethics-being-as-design (discussed in the next section). For in the end, this analogy requires a theory of justification, and her moral conventionalism provides little ground for introducing one.

Ethics-as-design

To be able to appreciate Whitbeck's theory of ethics-as-design, it must be kept in mind that Whitbeck aimes to construct a theory in which fundamental ethical questions can be avoided. Ethicists have, in her view, focused too much on such fundamental issues while people seem to be quite able to solve moral problems in practice without waiting for philosophers to agree with each other (see also Jonsen & Toulmin 1989, prologue). Moreover, with Baier (1985), Whitbeck is unhappy about the seemingly undecidable competition between ethical theories. This explains her plea for a tolerant and broad moral vocabulary. Whitbeck's solution aims at showing that we can deal with such a wide range of (apparently competing) moral demands.

In addition, and, perhaps, even more important, Whitbeck's ethics-as-design thesis is about the nature and structure of moral problems. According to Whitbeck, moral problems are often framed as a multiple-choice dilemma: a problem with a fixed number of possible alternatives of which one, and only one is right. This is misleading, says Whitbeck. In her view, moral problems resemble (engineering) *design problems*, which she characterizes as follows:

> Although for interesting or substantive engineering design problems there is rarely, if ever, a unique correct solution, two solutions may each have advantages of different sorts, so it is not necessarily true that, for any two candidate solutions, one must be incontrovertibly better than the other...Although no unique correct solution may exist, nonetheless, some possible responses are clearly unacceptable—there are wrong answers even if there is not a unique right answer—and some solutions are better than others (Whitbeck 1998a, 58-9).

Whitbeck's characterization of a design problem can be clarified using two concepts used in design methodology: *ill-structured problems* and *well-structured problems* (or ill- and well-defined problems[6]). In design methodology, the notion of an ill-structured problem is used to describe design problems. Well-structured problems (such as, for instance, basic arithmetical calculations or crossword puzzles), mostly have clear goals, fixed alternatives to choose from, usually maximally one correct answer and rules or methods that will generate more or less straightforward answers. Ill-

defined problems, on the other hand, have no definitive formulation of the problem, may embody an inconsistent problem formulation, and can only be defined during the process of solving the problem. Moreover, ill-structured problems may have several alternative (good, satisfying, etc.) solutions, that are not easily compared with each other (cf. Cross 1989, 11-2; Rittel & Webber 1984; Van der Poel 2001, p. 431).

Whitbeck argues that moral problems are like design problems, they are ill-structured problems. Being practical problems, moral problems are seldom clear-cut or completely given at first hand. When dealing with a moral problem, new problems and possible solutions may arise, and (should) become part of moral reflection. It must be noted that Whitbeck has argued plausibly that moral problems can be considered to be *practical problems* (ill-defined, ill-structured etc.), but she has not shown how design problems and moral problems resemble *each other* besides both being part of the same class. This need and will not be really problematic: Whitbeck can show how the way in which designers solve design problems, being practical problems, may be *instructive* in dealing with moral problems. Indeed, this is exactly her point:

> Because engineers recognize the importance of engineering design as well as engineering theory, they appreciate the importance of practical as well as theoretical problems and of synthetic as well as analytic reasoning. Devising a good response requires synthetic reasoning. Ethics has been more involved with analytic reasoning... (Whitbeck 1998a, p. 55).

The notion of synthetic reasoning is central in Whitbeck's thesis. When designing, engineers try to satisfy as many demands as possible by finding solutions that do justice to as many as possible demands. The idea that we can fulfill only one demand should, says Whitbeck, be abandoned—instead we could try to find a solution or response that goes a long way toward meeting a variety of demands simultaneously. Even though some moral problems may be irresolvable, it is misleading to present them as such from the start. "The initial assumption that a conflict is irresolvable is misguided, because it defeats any attempt to do what design engineers often do so well, namely, to satisfy potentially conflicting considerations simultaneously" (p. 56).

By presenting moral problems as well-structured or multiple-choice problems, ethicists have implicitly suggested that we should choose one of the given alternatives through a rigid analytic methodology. This is

misleading, Whitbeck argues, because it is in the nature of moral problems to resist such rigid methodology, and because synthetic reasoning may lead to more preferable, creative, and middle-way solutions. Three of Whitbeck's examples, to be understood as rules of thumb for solving moral problems, illustrate what such synthetic moral reasoning may look like.

Firstly, the *unknowns and uncertainties* in the situation have to be considered. Some uncertainties cannot be resolved immediately, and should then be understood as a defining characteristic of the problem situation. Secondly, the *development of possible solutions* is separate from the definition of the problem and may require *more information.* Whitbeck puts forward the traffic signs case. In this case there are two intersections, one in a rural area suffering from a small number of fatal deaths, and one in an urban area suffering from a large number of small accidents. There is only money for making safety improvements at one intersection. The moral philosopher would tend to present this dilemma as a forced choice between spending money on one intersection or on the other. This is misleading, says Whitbeck, because there are alternatives that might be morally better: for example, the solution to build cheaper traffic signs on *both* intersections. Furthermore, a lot of information might be missing in this case. If in the urban area most accidents are caused by drunk drivers, it would hardly help to change the physical characteristics of that intersection. Thirdly, it is often important to start *pursuing several possible solutions simultaneously* in case one of the solutions meets insurmountable obstacles. Since there is only limited time to deal with a moral problem, there should be a good balance between keeping options open, and, at the same time, avoiding spreading one's energy too broadly.

In general, Whitbeck's approach focuses on issues and strategies that are part of the process of problem solving. For her, dealing with moral problems is not only or primarily a matter of *moral knowledge*, it is a matter of *moral skill* or *wisdom*, implying flexibility, interpretative skills and creative solution finding. Her Aristotelian approach has much in common with virtue ethics. Indeed, Whitbeck shares its rejection of approaches that emphasize rules and principles rationally derived by a critical evaluating spectator. Yet, Whitbeck's theory differs from virtue ethical approaches in that the idea of character or disposition hardly plays a role in her theory. Moral skill, in my interpretation of Whitbeck's view, does not derive from a certain character, but must be interpreted as a cognitive ability, literally an engineering skill. Whereas virtue ethics focuses on the question 'who should I be,' Whitbeck's approach is about the question 'what shall I do' or 'how shall I handle this problem.' And whereas classical ethical theory tends to focus on moral

judgment and justification, and virtue ethics on moral character, Whitbeck tries to lay bare a different ethical issue: moral acting and the process of moral problem solving.

Whitbeck's analogy of moral problems with engineering design problems has a number of attractive features. It shows that moral acting is not only about deciding between a fixed number of alternative actions or values, but that it also involves a process of acting in which the moral problem unfolds itself and new options may arise, options that may bring together seemingly conflicting moral demands. Moral reasoning is not only about defending a solution; it is also about *finding* one. Her dynamic approach allows for uncertainties and changing interpretations of the moral problem.

The risk of black boxing

By emphasizing the process of moral problem solving, Whitbeck has tried to avoid the controversial issues in philosophical justificatory ethics. She believes that much controversial ethical debate needs not be imported when dealing with everyday life moral issues. Justificatory ethics, in as much as it uses cases, treats those cases in an instrumental way: to test or to reject a certain justification or even to show that such justification is not possible. Because of this role, these cases are often about extreme situations (think of Sophie's famous choice). But, according to Whitbeck, such examples rarely occur in real life, and the answers philosophers have come up with are relatively useless as well. In practical ethics, answers to more ambiguous and realistic cases are needed.

In Whitbeck's cases, the norms and values at stake are often clear and unproblematic. In her favorite example, the case of a superior who wants you to dump chemical waste through the drain, the ideal solution would be one that would be *both* loyal *and* truthful. A good product design would be as safe, for as many people, *as possible*, taking into account individuals' rights, and so forth. Whitbeck focuses on the questions of how to make sure that all of these values are appreciated, and how to synthesize and satisfy these different demands. She does not question how these values can be justified. For Whitbeck, a moral problem is about dealing with a number of given ethical constraints (Whitbeck 1998a, p. 72) using designing skills rather than applying moral theories. This sounds attractive, for it puts aside the question what moral requirement should be called for in a particular case, and how it should be justified, and suggests that it is possible to satisfy all these, sometimes conflicting, requirements.

But does all this convince? I think it does not—or, at least, not enough. Whitbeck may be able to avoid fundamental justificatory issues, but cannot eliminate them. In the example of the traffic lights we do not, in Whitbeck's view, *have* to make the fundamental choice between either a small number of fatal accidents or a large number of minor ones. If we put cheaper signs on both intersections, we can by-pass the ethical dilemma. But that is exactly what this is: by-passing. The fundamental issue, in my opinion, remains unresolved. For, the third solution is not an answer to the fundamental dilemma of how, when and whether minor accidents can be balanced against fatal ones. Whitbeck is right in stating that when dealing with concrete moral issues, such fundamental questions need not be solved immediately, and that sometimes a better solution may be at hand. But this does not imply that those fundamental issues have disappeared completely and some may want a plausible answer to them.[7]

Whitbeck does not address 'ethical' issues at all, if we understand 'ethics' as the study of fundamental moral questions, begging a well-informed (i.e., a justified) answer. Even if we grant that concrete moral problems can be seen as ill-structured design problems, and admit that in practice they can often be solved as such, it is not at all obvious that the same is true for 'ethical' problems. Fundamental ethical issues require rational, systematic answers, which are properly justified and communicable, rather than pragmatic, design-like, solutions. Whitbeck has neither shown that such fundamental issues have been solved, nor that her theory allows us to solve them. Fair enough: Whitbeck may of course just acknowledge this, claim that at least she has shown that it is possible to solve *many* dilemmas without getting into fundamental debate, and to take the remaining ethical issues for granted. Her theory has a blind spot, but this may be compensated for by the fact that it seems to be able to give guidance in many practical situations where moral issues are involved.

But does it really guide? Here, again, Whitbeck owes us some answers. Above, I mentioned Whitbeck's inability, due to her moral conservatism, to justify moral norms. But, Whitbeck's theory not only lacks such external justification (concerning the values and principles at stake), it also raises many questions about what we may call internal justification (concerning the evaluation of a moral course of action). Whereas Whitbeck states that a variety of principles and rules *may* be relevant in a certain concrete situation, she does not give us anything to go by in deciding *which* principles, rules, or standards should be or should have been selected, and *how* they should be brought together. If the moral agent is to practice his/her design-like skill, and choose in a designer-like way if and what principles are relevant and how

or to what extent they should be met, how can we tell, in the end, if his/her choices were *right*? Furthermore, if moral agency is viewed as a skill, how can we test whether or not this skill has been adequately performed, or if someone masters this skill? And, given Whitbeck's claim that moral problem solving is better understood as a constructive process rather than as a single decision, wouldn't we need some specific criteria to evaluate such a process? Without such criteria or a decent methodology, Whitbeck is just 'black boxing' the moral decision process, and leaving us without a clue as to how the moral agent could (rationally) justify his/her decisions.[8]

Note that my claim is *not* that, if we view moral problems as design problems, there are no answers to these questions. What I do claim is that Whitbeck's assertion that her theory is able to deal with several conflicting demands at once is a very ambitious one, and begs far more argumentation than she has given. 'Designing,' in Whitbeck's book, remains some kind of magical device, apparently able to solve some very difficult problems. But apart from giving some generally useful practical tips (try to gain as much information as possible, try to keep your options open, etc.), the design analogy is quite empty. At the very least Whitbeck should have shown how designers analyze and structure their design problems, and gain more insight into the problems at hand. She could have shown how designers deal with trade-offs (which is the usual way of designers to deal with conflicts between requirements) and how such choices are evaluated (cf. Van der Poel 2001, p. 432). Or she could have tried to give a systematic account of the several characteristic phases (for example: synthesis, setting requirements, analysis, evaluation) of the design process (see, for example, Cross & Roosenburg 1996, p. 334), and show how these phases compare and interact with each other, and what practical and cognitive skills are involved in them. I think that Whitbeck has stressed the synthetic aspect of designing too much, at the cost of the, just as important, rational and analytic aspects of it.

Whitbeck could also have been far more convincing with regard to justificatory theory. Perhaps she could well have defended her theory with a pragmatic justificatory theory. In fact, she seems to be in favor of a pragmatic approach. In her comments on moral wisdom, for instance, she writes: "Everyone makes mistakes, but responsible people exercise care not to make many and learn from their mistakes. Wise people learn from the mistakes of others and so do not have to learn everything 'the hard way'" (Whitbeck 1998a, p. 68). More specifically, Whitbeck is close to what Arras calls the "new philosophical pragmatism" (2002, p.35) in bioethics with respect to her criticism on rational foundationalism and her emphasis on finding practical solutions to apparent fundamental dilemma's. But, as Arras rightfully states,

pragmatism still needs a 'criterion of success' (or, in Whitbeck's case, a criterion for mistake) and a way to choose between rival value judgments. This is, Arras claims, and I agree with him, "the traditional role allotted to moral principles in ethics and the theory of justice" (49-50).

Whitbeck, however, appears to be totally indifferent to the justificatory issue, and does not make plausible in any way how such (pragmatic) justification or systematization might be accounted for. All this renders her design analogy too vague and too unsystematic to be of real use in ethics, and also does little justice to design methodology itself.

Conclusion

Whitbeck has tried to construct a descriptive moral theory, which aims at diverting fundamental justificatory issues in order to be more helpful in dealing with moral problems. She has tried to show that designer skills can help satisfy relevant moral demands in an integrative way, and has claimed that this allows us to include a large set of norms, values and principles in the moral vocabulary. Whitbeck has stressed that moral problems are in fact practical problems, and has argued that this allows people to deal with moral issues in a more pragmatic way.

But her design analogy has turned out to be a reduction of moral problems to practical ones in which she has both ignored the special justificatory nature of moral problems, and has failed to give adequate content, which might have made it more convincing, to her design analogy. By rejecting (or neglecting) rational foundationalism and other justificatory approaches, Whitbeck lacks the necessary normative sources to evaluate the norms and values at stake, as well as the moral design itself—thus debarring both external and internal justification. Original as it may be, Caroline Whitbeck will have to show that her theory is more than an ethical potpourri, which lacks a criterion to help construct or justify a particular moral mix.

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Notes

[1] For example by Arras (2002).

[2] Relevant papers by these authors can be found in Clarke & Simpson (1998).

[3] Whitbeck's design analogy is worked out in her book; her critique on rational foundationalism is mainly dealt with in the online (i.e. unpublished) philosophical appendix of this book.

[4] Note that, for Whitbeck, rational foundationalism and principalism are more or less the same, or they carry at least a number of shared features she wants to criticize.

[5] Whitbeck does not claim that rational foundationalism has no empirical basis whatsoever. Most ethical theories, including rational foundationalist ones, seek support from examinations of moral intuitions or particular moral judgments. For as far as Beachamp and Childress have suggested otherwise in the first print of their *Principles of Biomedical Ethics,* they have long since admitted that moral principles are not just applied to particular judgments, but actually grow out of them (see Arras 2002, p. 47). Both Beachamp and Childress, and Jonsen and Toulmin favor a bottom-up-top-down approach, in that particular judgments may help discovering moral regularities (principles, rules, guides), which can, in their turn, be used for

(applied to, guide) particular moral judgments (compare, for example, the two models in Jonsen & Toulmin (1989, p. 34-5). The "general warrant based on similar precedents" compares reasonably well with this interpretation of Beachamp's and Childress' moral principles). Whitbeck suggests, however, that such investigations of our moral intuitions can never lead to more general principles to be used as guides for moral actions. We can only decide what to do when confronted with a particular moral problem. As far as this is concerned, Whitbeck's philosophical framework turns out to be closer to particularism than to casuist approaches that allow for inductive theorising through bottom-up analogical reasoning, in that it both denies the possibility of formulating general principles, and promotes a contextual (holistic) view on moral judgement (see, for example, Hooker & Little (2000).)

[6] The terms 'ill-structured' and 'ill-defined' are related and are both considered to be characteristic features of design problems. Even though there is, strictly speaking, a difference between ill-structured and ill-defined problems (one referring to the structure of the problem, the other referring to the way the problem is defined), the terms generally are used interchangeably (cf. Dorst 1997, 48-9).

[7] I find support for this claim in Adam Morton's interesting work on moral dilemma's. Morton claims that even when there are tactful ways to prevent moral dilemma's to arise, the root of the dilemma remains, and both horns of the dilemma may be 'intrinsically difficult to balance' (Morton 1991, p. 4).

[8] I fully agree with Van der Poel here, who has claimed that "solving a moral problem properly not only requires the skill to design possible solutions, but also requires the skill to assess such solutions on its moral acceptability" (my translation, Van der Poel 1999, p. 255). Also, van der Poel emphasizes the possible role of ethical theory in structuring an (unstructured) problem (p. 254).

The Power of Positive Thinking: A Review of Paolo Parrini's *Knowledge and Reality*.

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Knowledge and Reality: An Essay in Positive Philosophy. Parrini, Paolo. Dordrecht: Kluwer Academic Publishers. 1998, pp. 218 + xix.

Parrini's *Knowledge and Reality*, is modest in length but not in scope. In just 216 pages, Parrini argues for a redefinition of truth, objectivity, and rationality in order to ground a new approach to philosophy itself, all while attempting to revive positivism as a philosophic doctrine. As with most positivists, science serves Parrini primarily as a role model for rational inquiry. This text, therefore, is best seen as a work in core philosophy (particularly epistemology) which mitigates the lack of attention paid to major innovations in contemporary philosophy of science by thinkers such as Van Fraassen, Cartwright, Kitcher, Longino and Shapere. This lack strikes me as perhaps the major fault of a work which is otherwise well worth investigation.

According to Parrini the task of philosophy is to describe and repair the flaws and lacunae in our current conceptual structure (pp. xiii; 91). Rather than defending this view, Parrini instantiates it by providing an extended analysis and reconstruction of key notions in epistemology. His argument begins with a description and evaluation of Logical Positivism. Parrini's account, in chapter 1, whilst sympathetic, is closer to the canonical view than to any recent revisionary views. The key point for Parrini is that the fatal flaws of Logical Positivism (see p. 16 ff) arise from its formulation in terms of linguistic philosophy. When stripped of this linguistic 'straightjacket', a core philosophic program which is prima facie viable and is true to the spirit of the 19th century positivists, remains intact. Parrini identifies three major features of this core, "…relativism, empiricism and anti-metaphysical objectivism" (p. 16). The remainder of Parrini's text is devoted to working out the details and consequences of this program.

Parrini begins his detailed account with a discussion of relativism (perhaps better thought of as 'conventionalism', but I will retain Parrini's term here). In chapter 2, Parrini sets out what he calls Epistemic Relativism which has three dimensions: linguistic, theoretic, and axiological-methodological (see p. 40 ff). His point is that each of these areas; language, world-view and methods and

values, are independently affected by more than just the nature of the 'world'. In chapter 3, Parrini addresses empiricism, following (p. 74 ff) Mary Hesse's 'Network' model of the relation of observation and meaning. On this account some predicates have their extension determined, in part, by empirical means. So that although the subsequent development of associated conceptual structures may be largely theoretical, it is always possible that theoretical disagreements may be resolved by appeal to this empirical basis.

It is worth pausing at this point to identify two arguments that first appear in chapters 2 and 3 and play a major role in subsequent developments. In chapter 2 Parrini argues for a contextual notion of concepts (such as the *a priori*—p. 51 ff), which he later deploys to rescue a notion of normativity (in chapters 6 and 7). The motivation for this view is the requirement to navigate between the Scylla of radical relativism and the Charybdis of metaphysical absolutism. The other argument of note is chapter 3's use of a possibility argument to establish the importance of empiricism (p. 74 ff). That Parrini is 'reduced' to arguing from the possibility of something to the importance of that something is a clear signal that he is fully committed to positivism's contingency; a commitment that is engendered by the navigational challenge mentioned above and that reappears in Parrini's positive account of anti-metaphysical objectivity later in the book.

In chapters 4 and 5, Parrini addresses what he takes to be the two major alternative accounts of an epistemology marked by Epistemic Relativism and Network theory. In chapter 4, he looks at Logical Idealism and in chapter 5, Metaphysical Realism. In both cases, Parrini argues that the views ought to be rejected because they contain an appeal to an absolute philosophic standard and such standards lead to insuperable puzzles. Basically both views are connected with scepticism (p. 113 ff), which Parrini regards as a reductio of any view that entails it.

Parrini's positive account begins in chapter 5 with a discussion of Fine's 'Natural Ontological Attitude' (p. 135 ff), which he takes to be the right descriptive account of our everyday realist intuitions. The remaining challenge, taken up in chapters 6 and 7, is to provide a reconstruction of objectivity (chapter 6) and associated notions; truth (chapter 6), and rationality (chapter 7), that is neither too relativist nor too absolutist. Parrini's solution is to combine Kantian constitutivity with the contextual argument mentioned above. The result is a set of ideas that have inter-theoretic reach; we must always evaluate our views objectively with an eye on their truth and rationality (these notions therefore constitute the

normative standards of our cognitive activity). On the other hand, without a context these ideas are no more than ideals; the concrete aspects of these notions that allow them to do real work within our cognitive economy arise only once we have established a context. Parrini's best guess as to how this works in practice (see, for example, p. 185) is that successive theoretical structures become more and more coherent; including a wider range of material and richer interconnections between notions.

The view outlined is a tantalizing one, and Parrini is careful to state that his account is not guaranteed, as is appropriate for a positivist, but I think it faces a dilemma. If key notions are merely constitutive, are they really doing any work; if they are more than that, have we avoided the metaphysical element that so worried Parrini? That is, if *all* the standards that objectivity and the like make normative come from a given context surely the idea itself is vacuous. On the other hand, real inter-theoretic standards are exactly the entities which Parrini is so keen to avoid. Such worries are par for the course, of course, and Parrini's essay remains an intriguing attempt to balance the competing requirements on any contemporary epistemology, particularly one that honours the rational structure of science. Given this, it is a shame that we do not get more on how Parrini sees his views as complementing and/or critiquing those of the philosophers of science I mentioned at the beginning of this review. That said, anyone with an interest in the large scale structure of epistemology should find this work worthy of investigation.

In concluding this review it should be noted that the text is a translation, carried out with the approval and under the supervision of the author, by Paolo Baracchi. Baracchi also provided the text's extensive index, a useful table of contents, and a great deal of the internal structuring of the work.

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Review of *Philosophical Tools*

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Philosophical Tools for Technological Culture: Putting Pragmatism to Work. Larry Hickman. Bloomington, Indiana University Press, 2001.

> Philosophy recovers itself when it ceases to be a device for dealing with the problems of philosophers and becomes a method, cultivated by philosophers, for dealing with the problems of men. (John Dewey, "The Need for a Recovery of Philosophy," p. 95.)

In *Philosophical Tools for Technological Culture: Putting Pragmatism to Work,* (2001), Larry A. Hickman argues that thinking about philosophy, with Dewey, as being properly concerned with the actually existing problems of human beings, and that placing a philosophy of technology at the center of our philosophical concerns, is necessary "if we are to convert conditions that range all the way from what is merely irritating to what is life-threatening into situations that are stable, harmonious, and more nearly what we wish them to be" (p. 28). Hickman finds great advantages in John Dewey's philosophy, properly understood as "productive pragmatism." As a philosophical tradition with explicitly applied intent, Pragmatism might be expected to be a central player in our discussion of science and technology. And, while it is flourishing in certain particular arenas (consider Andrew Light's work on Environmental Philosophy and Glenn McGee's in Bioethics), as Larry Hickman has pointed out, citing the estimable *American Philosophy of Technology: The Empirical Turn* (2001), Pragmatism is often strangely absent from more general discussions in philosophy of technology. Taken together with the fact that philosophy of technology is itself rather at the margins of mainstream philosophy, Hickman has a difficult task indeed.

Philosophical Tools for Technological Culture is Hickman's most recent installment in a 20+-year project. Thirteen years ago, *John Dewey's Pragmatic Technology*. (Bloomington: Indiana University Press, 1990), brought Dewey more fully into the purview of philosophers of technology, and philosophy of technology to the attention of pragmatists. But, the roots of this project stretch back more than ten additional years and are evident in the selection of texts and the excellent editors remarks in three edited collections published between 1981

and 1990: *Technology and Human Affairs*, edited with Azizah Al-Hibri. (1981); *Philosophy, Technology, and Human Affairs* (1985)*; Technology as a Human Affair* (1990), as well as in numerous articles and presentations.

The present work contains nine chapters, eight of them previously published, and the ninth, "Tuning Up Technology," was presented as the Berry Lecture at Vanderbilt University in 1994. A frequent shortcoming of books that start their life as separately written essays is that they remain just that, a collection of separate essays. Such is not the case for *Philosophical Tools for Technological Culture*, where the notion of "productive pragmatism" is used to "leaven the entire volume" (p. 4). Hickman argues that "productive pragmatism" is preferable to "instrumentalism" as a characterization of Dewey's work, citing Dewey's own later dissatisfaction with "instrumentalism." The separate essays work together, and the book reads as if it was written all of a piece. The key here is "Tuning up Technology," which appears as Chapter 1. In this chapter, Hickman places Dewey in the context of the history of western philosophy and argues that his philosophy of technology is central to Dewey's work. Counter to other accounts of technology (the device paradigm, technophobia or technophilia, technological determinism, and so on) Hickman argues that, "Technology in its most robust sense, then, involves the *invention, development, and cognitive deployment of tools and other artifacts, brought to bear on raw materials and intermediate stock parts, with a view to the resolution of perceived problems"* (p. 12, italics in the original).

Through the remainder of the book Hickman places "productive pragmatism" in dialogue with Ellul, Benjamin, Marcuse, Horkheimer, Habermas, Heidegger, Ortega y Gassett, Mumford, Niebuhr, Rorty, Bergmann, Ihde, Pitt, Mitcham, Feenberg, Mesthane, Peirce, James, and Whitehead. Hickman takes on a wide range of matters of contemporary concern including the nature and possibility of community, the role and character of education, religious belief, anti-scientific thinking, populism, and throughout it all democracy. Hickman argues for a politicized technology and a technologized politics. He summarized some of these thoughts in a recent presentation, saying "Our efforts at democracy will doubtless require that we improve the tools and techniques that we now have. But we cannot have more democracy without more technology, in the sense that I have employed the term. This is because technology is the means by which we tune up our tools and techniques" (Hickman, "Response to Hanks").

One of the great virtues of *Philosophical Tools for Technological Culture* is the manner in which Hickman responds to two critiques often raised against Dewey: i) that he is ultimately an apologist for the status quo who recommends an increased reliance on experts, and ii) that his instrumentalism is reductionistic.

Carl Mitcham suggested that the second of these haunts not only Dewey's work, but also Hickman's 1990 *John Dewey's Pragmatic Technology* (Mitcham 1994). The problem is this, if all human activity is "instrumental," in Dewey's terms, or "technological" in Hickman's, then what have we learned and what is gained through the use of these categories? Hickman turns to this matter early in the book with a four-part typology of human activities. The four types of activities are those that involve tool use, the technological (tool use and cognitive activity) and the technical (tools use but little or no cognitive activity), and those that do not, the non-instrumental but cognitive, and the non-instrumental and non-cognitive. The first two of these involve tool-use, but only the first is technology properly understood. On this Hickman has commented, "I argued that technology is a term that should be treated as analogous to biology or geology. Technology is inquiry into our tools and techniques" (Hickman, "Response to Hanks"). Important in this typology is the clear fact that a significant portion of human activity is not technological as understood on this typology, and, as Hickman notes, much of it falls into the fourth category, the non-cognitive and non-instrumental. "The greatest part of life," he writes, "is what is immediate and habitual."

The critique of Dewey's work as calling for a technocracy has been heard from the political left and right, and Hickman responds to charges from both quarters here. The fundamentalist religious right attacks Dewey and science, often in the same breath. And, the critical theorists, starting with Horkheimer, find Dewey's talk of "instrumentalism" indistinguishable from the instrumental rationality critiqued in works such as *The Dialectic of Enlightenment*. These are no mere problems of theory, as almost daily we learn of some attempt to roll back the serious presentation of science in public education or policy, or yet another technological advance so complicated that it is presumed beyond the understanding of most people

Hickman takes on this difficult matter throughout. In Chapter 2, "Technology and Community Life," he argues that precisely because it excludes democratic participation and denies the importance of individual experience, technocracy is a social dead-end. "Wherever individuals are not free to articulate problems and to

attack them experimentally, then growth within the society is greatly diminished" (p. 57). Chapter 7, "Populism and the cult of the Expert," is Hickman's extended defense of the notion that democracy is educative, that technology and democracy are forms of inquiry (drawing on Peirce and James), and that together these considerations lead us to understand a carefully circumscribed role for experts. In developing Dewey's critique of the Cult of the Expert, Hickman makes use of the notion of "political technology" as developed by Michael Eldridge in *Transforming Experience* (1998). Analyzing and contrasting the political work of Randy Shaw and Ralph Reed, Hickman argues that while political technology can take many forms, we can identify those that are more responsible because they are those that involve those most affected in experimental and democratic processes (Shaw, and not Reed). These political technologies are the sort Hickman has in mind with the notion of productive pragmatism.

We can understand Hickman´s book as an extended argument that technology and democracy are compatible and mutually supporting practices. According to Hickman, if we understand the technology and democracy as fundamentally different, and perhaps even incompatible, human practices, then we will i) understand neither technology nor democracy, and ii) this failure in understanding will hinder our efforts to improve both technology and democracy. In chapter 9, "The Next Technological Revolution," Hickman distinguishes productive pragmatism from other forms of praxis philosophy such as critical theory and phenomenology on three grounds. First, while the other traditions of praxis philosophy tend to merely invert the theory/praxis hierarchy, pragmatism holds that neither has priority, but rather that each requires the other. Second, productive pragmatism "advances the view, which it claims is derived from technological experience, that the norms of technology are produced as by-products of technological activities themselves, and not introduced from the outside...They arise from the interaction of theory and practice as it provides intelligent answers to perceived problems" (p. 181). And, third, unlike other praxis philosophies, productive pragmatism, in both Dewey's and Hickman's versions, places a philosophy of education at the center of our concerns.

There are a few matters on which I am not sure I am convinced, or perhaps more accurately, I want to hear more, one terminological and the others more substantive. First, Hickman uses the term "technosciences" throughout to refer to the complex of scientific and technological practices that characterize contemporary culture. I agree with his argument that the traditional separation

between the scientific and the technological is problematic under careful examination. So, it is not the meaning so much as the word itself I find problematic. Perhaps it is the hangover from years of reading a certain critique of technoscience as either precisely the sort of encroaching evil that Horkheimer criticized, or to characterize the problematic dimensions of contemporary science and technology (see, for example, Haraway 1991). I should note, that refiguring the term as Hickman does has the salutary affect of calling us back to reexamine what we think we already know.

Second is the matter of desire, and third the matter of feminism. In defining technology as he does, as geared "toward the resolution of perceived problems," Hickman opens the question of the formation of desire. Perceived problems are those we notice because in someway(s) desire is thwarted. But, since desires are rooted in who we are, and who we are is shaped by, among other things, our social, and hence technological, setting, it could seem that technology responds to the problems of technology. Hickman addresses this when responding to Horkheimer in chapter 3, "Productive Pragmatism, Critical Theory and *Agape*," (see pp. 72-4), but I suspect he has more to tell us. The other matter is a lack of explicit encounter with feminist philosophies of technology (see, for example, Haraway, *Simians, Cyborgs and Women,* and Wajcman, *Feminism Confronts Technology).* Hickman's work is clearly informed by such an encounter, but in this instance as well I suspect he has more to tell us.

Hickman's engaging and important book reads relatively easily and quickly (I first read it while on vacation in Spain where distraction was ever-present). This is not to say that it is light. The arguments tend to linger, slowly working and expanding our thinking of philosophy of technology, the leavening of productive pragmatism moving from these pages into our theory and praxis. In our present situation, with both technology and politics moving away from the model of productive pragmatism, and an increasingly attenuated public discourse about these matters, Hickman's work is a timely call to recover philosophy, and ourselves.

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Tool-Being: Through Heidegger to Realism

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Tool-Being: Heidegger and the Metaphysics of Objects. Graham Harman. Peru, IL: Open Court Publishing, 2002.

With *Tool-Being*, Graham Harman seeks to reinvigorate both Heidegger studies and realist metaphysics. This book, confidently promises to alter the direction of Heidegger interpretation—away from human-centered concerns with *Dasein* and language and toward a concern with objects themselves—and in so doing to open a route for a realist metaphysics that will incorporate the phenomenological critique of naïve realism. Striking claims, but backed up with scholarly thoroughness: Dr. Harman has read every published volume of the *Gesamtausgabe* in the original German, and puts that knowledge to rigorous use with both scholarly thoroughness and originality of thought.

Tool-Being provides, in three well-structured chapters, a thorough unpacking of two central axes present within Heidegger's thought. One is the famous distinction between *presence-at-hand* and *readiness-to-hand*—it is the latter term which Harman re-christens as "tool-being," while the former can be viewed as the "broken tool." Despite the claims of his interpreters and his own wishes, almost the whole of Heidegger's conceptual array—*Ereignis*, temporality, Angst, etc.—reduces to a monotonous replay of this basic insight: that each thing is at once present-at-hand and ready-to-hand.

The recognition of this insight flattens virtually all Heidegger interpretation, including Heidegger's self-interpretation: human Dasein does *not* possess an authentic possibility that sets it outside of mere presence-at-hand; Dasein *is* the interplay of presence-at-hand and readiness-to-hand. But not only Dasein: even the infamous lowly hammer is not merely present-at-hand, it is also ready-to-hand. What Heidegger, and Heideggarians, failed to recognize is that the tool analysis does not refer only to specific humanly-produced technologies, but to *all* beings. And not only is this true of *Being and Time,* but this axis permeates the whole of Heidegger's thinking, from his earliest recorded lectures onwards—"*Kehre*" notwithstanding. In short, by elaborating the tool/broken-tool distinction, Heidegger has provided a—quite narrow—opening into a philosophy of objects.

Beside the presence-at-hand/readiness-to-hand axis, there is a less elaborated and far more often overlooked ontological distinction: Heidegger's appeal to the difference between a being as "something at all" and as a "specific something." These two axes, when crossed, present the only specification—an obscure one—of what might lie beyond the repetition of tool and broken tool: the *fourfold*. It is from this opaque yet tantalizing hint that Harman begins, in the final chapter of *Tool-Being*, to tease out the threads of his own philosophy of objects, borrowing insights from recognized philosophical heavyweights and fascinating metaphysical wild-cards.

Chapter One presents a commentary on Heidegger's thought, centered around the tool/broken tool tension, with an indication of the fourfold. Heidegger's mission was to show the inadequacy of philosophy's reduction of being to presence-at-hand. He failed to fully understand the breadth of tool-being as the counterpoise to presence-at-hand, through his tendency to view human being (Dasein) as having privileged access to tool-being, and hence thought of non-human objects as "merely" ontic. Instead, inanimate objects are "like undiscovered planets, stony or gaseous worlds which ontology is now obliged to colonize with a full array of probes and seismic instruments—most of them not yet invented." (p. 19)

Heidegger's central metaphysical discovery and obsessive theme is this: "*The world of tools is an invisible realm* [the ontological] *from which the visible structure of the world* [the ontic] *emerges*." Naïve realism assumes that an entity's being will somehow be manifested in natural appearance (presence); actually, the very *being* of an entity consists in its withdrawal from any presence. The being of a bridge consists in its efficacy, not in any particular element of its constitution, or even in a gestalt of those elements: the bridge, as ready-to-hand, is of necessity *invisible*. Along with invisibility, the other distinguishing trait of tool-being is *totality*: entities always dissolve into a totalizing "global tool empire."

Both these distinguishing traits combine into *referentiality*. Entities refer in two senses: to the *totality* into which they disappear, and to the *withdrawal* by which they effect that disappearance. The former process produces presence-at-hand, the latter readiness-to-hand. Again, this description applies to all entities, and it is illegitimate to privilege human consciousness with regard to the drama of entities. A knife could only cut a piece of paper if knife and paper encounter one another *as such*.

Given the totality of tool-beings, how does anything other than readiness-to-hand arise at all? From the "broken tool," that is, from presence-at-hand. "Broken" here does not mean "malfunctioning," but a more general "having become obtrusive." The tool and the broken tool are the central players in the drama of Heidegger's thought.

Several sections trace out repeated—and failed—attempts by Heidegger to develop a framework that would privilege human access to being. However, Heidegger does point us toward the distinction between the entity as "something in general," and as "*something* in particular." From this new axis, crossing the generally recognized *Vorhanden*/*Zuhanden* axis, the fourfold will develop.

Chapter Two examines Heidegger scholarship, particularly the two principal schools of Heidegger commentary: "Aristotelian" continentals and "pragmatist" analytics. Attention to linguistic signs, historical antecedents, "philosophy of language" and *praxis* do not make up for a common inability to grasp that presence-at-hand does not refer to something which is transcended by human activity, of whatever kind.

In "The Threefold" a surprisingly mild critique of David Farrell Krell—surely one of the most over-rated of the now-fading previous generation of academics—is provided. This section shows that the threefold structure of ecstatic temporality fails to provide anything beyond the basic tool/broken tool dichotomy.

"The Fourfold" has been misunderstood, as shown by the inadequate standard view on the subject in Richardson's *Heidegger: Through Phenomenology to Thought*. The fourfold, rather than being a sloppy bit of poetic excess, specifies four domains within each being: "earth" is that which is concealed and "something at all," "gods" that which is concealed and specific, "mortals" a revealed "something at all," and "sky" a revealed specific something. Strange hints, but they point us beyond both the simple repetitiveness of the tool/broken tool dichotomy and the excessive simplicity of naïve realism—toward a revived version of substance theory.

Chapter Three outlines Harman's object-oriented philosophy, working out of the Heideggarian inspirations examined in the first two chapters, with important borrowings from Whitehead, Levinas, and Zubiri. A theory of substances is presented, with the following features:

1. Substance is not a particular kind of entity, but belongs to all entities.
2. Tool-beings lies outside the "world" of Dasein, in a not yet determined "metaphysical vacuum."
3. Hence, there is no direct causality; a "local" version of *occasional cause* must be developed.

By seeing that there is a mutual objectification with which *all* objects confront one another, Whitehead recognized more fully than Heidegger that a "relational" philosophy would apply not only to the human domain, but to existence in general. However, Heidegger is ultimately more important, as he provides a route out of the reduction of the particular object, whereas for Whitehead there are ultimately no specific entities at all.

The last sections of this book are an attempt to begin to address the following question: given the radical gap between the ontic and the ontological, what could be usefully said about tool-being other than that it lies at an infinite distance from us?

A start has been made by Levinas and Zubiri. With his notion of the *il y a*, a version of "mortals" appears in Levinas' thought—a specific version of the "something at all"/"specific something" dichotomy. Hence, thought is a kind of *sincerity* for Levinas—a remaining-true to being, rather than a distancing from it. However, Levinas still restricts this breakthrough to the specifically human domain by linking the *il y a* to the experience of insomnia. But this structure is to be found in all entities & experiences.

Zubiri is able to discern specific essences for specific entities, even non-human ones, and to see that these entities contain within themselves a plurality of elements, but he affirms the ultimately unworkable traditional prejudice that some entities possess essences, while others are merely relational. If we accept that an entity is a community of "notes" (to use Zubiri's term), then this distinction won't hold up.

So, for Harman, entities should be conceived, neither as durable substances nor as mere sets of relations, but as some of each. But not only is every entity a set of relations, every set of relations is also an entity.

The final two sections of the book present a series of four paradoxes which follow from this first attempt at a philosophy of objects:

1. The object is both free of all relations and seems created by relations.
2. "Where *is* presence?" (p. 287) (in a world crammed full of tool-beings?)
3. There must be an "indefinite regress" within being, so as to forestall either a return to traditional substanialism or a slide into simple relationalism.
4. Given that a relation creates a new entity, the being of an entity can only exist in another entity—this leads us toward a non-theistic, "local" conception of occasional cause. In short, another kind of "regress," now, a descent inside the entity itself.

Given these "regresses," philosophy now should be "reverse engineering," rather than "unveiling." So, we are presented with the first steps in a desperately needed direction: to move philosophy away from talking about talking. Harman's next book promises to continue these steps.

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