the truth, yet not because it is formally false. Socrates ultimately agrees with Thrysamachus that justice is "the interest of the stronger," provided "stronger" is correctly understood. Thrysamachus's doctrine obscures the truth not because it is inherently false but because it is so easily misunderstood. At the same time, Socrates does not claim to have the truth in any substantive sense. His wisdom consists merely in knowing he does not know. Indeed, it is precisely Socrates' studied or cultivated ignorance—also known as irony—that makes him open to the truth. Modern technology, in Heidegger's view, can be characterized as a kind of reified dogmatism. It is so certain about how to construct this or fabricate that. It has an efficient method or procedure that excludes all other methods or procedures. And in this it does not

(Parenthetically, one can appreciate Heidegger's point without necessarily buying his substantive theory about the character of Being as an Ereignis or event that is ever undergoing historical changes in its worldly manifestations. One can simply say that an overwhelming involvement in the material level tends to detract from metaphysical or spiritual reality. Technology is a kind of existential rejection of the metaphysical or spiritual—in the sense of not paying attention—in the same ways that any dogma, precisely in its worldly powerfulness, rejects or ignores the more subtle affairs of mind and heart.)

recognize its own limits; it does not know itself.

But what is the way out of this difficulty? How can one respond to this reified dogmatism with the deepest part of one's self? The proper response is decidedly not, says Heidegger, simply to try to get rid of technology, to reject its rejection. Technology "will not be rejected and certainly not smashed" (p. 38). "Technology, whose essence is Being itself, will never allow itself to be overcome by human beings. That would mean, after all, that humanity was the master of Being" (p. 38). The overcoming of technology is more like "what happens when, in the human realm, one overcomes pain" (p. 38). The overcoming of technology must be lived through, extended and deepened, the way grief or pain can be lived through to the point that it becomes an observed grief or pain and thus in some mysterious way is set aside or transcended.

When we suffer or are in pain, we are simply too close to what we are experiencing; we need distance, some self-knowledge, appreciation of who we really are and of our limitations. But this is acquired not through rejection or repression of the pain; it comes only with time and through naming the source of our pain by asking questions and talking about it, rendering our suffering or recalling its background

of happiness in poetry and art, sitting quietly and experiencing its presence—or rather what is immediately and unobtrusively there, just on the other side of the curtain of our disturbed feelings-gradually standing back and becoming detached from the tossed surface of our conscious calculations.

It is remarkable that, as if to provide a positive counterpoint to his negative critique of technology, in other works Heidegger mentions just these kinds of experiences: questioning; art and poetry; Denken, or meditative, nondiscursive thinking; Gelassenheit, or detached acceptance. But at the end of the essay "The Question concerning Technology" he places the emphasis, appropriately enough, on questioning alone. "For questioning," Heidegger writes, "is the piety of thinking" (p. 36). There is, in the end, a sense in which technology must be questioned, and indeed invites its own questioning, in the same way Euthyphro's self-certainty almost begs for Socrates to punch holes in it. And it is this questioning of technology, or the attempt to enclose technological certitude within philosophical questioning, that is at the core of Heidegger's philosophy of technology.

Excursus on Ortega and Heidegger

Having discussed first Ortega and then Heidegger, consider briefly some relations between the two. On the one hand, there are many similarities in the thought of these two philosophers on the issue of technology. At the most superficial level, they are the first two professional philosophers to explicitly address the issue of technology. They also do so within the framework of an existential phenomenology that emphasizes the primacy of practical over theoretical concerns, is sensitive to the issues of freedom and destiny, and recognizes historical or lifeworld distinctions between different kinds of technology. (Although Ortega distinguishes three periods in the history of technology to Heidegger's two, Ortega's technologies of chance and of the craftsman can easily be interpreted as subdivisions within Heidegger's ancient as opposed to modern technology.) Both assert the deep affinity between humanity and technology while denying that the human is exhausted by the technological or that the essence of technology can be grasped through the technological. Both reject the definition of technology as applied science and view modern science as inherently technological. Finally, both see dangers in too much technology.

On the other hand, whereas Heidegger explicitly rejects the idea of technology as a neutral means—what he also calls the anthropological approach to technology—Ortega seems to affirm such a view. For Heidegger, technology as a form of truth is therefore a means for the revelation of Being, but one that hides its own essence. For Ortega, by contrast, technology is a means for the realization of some human project, although a project that gets hidden within an ever enlarged and penetrating technological effectiveness. For Heidegger technology is relativized by being associated with a regional (or limited) ontology; for Ortega any particular technics denotes a regional (or specialized) anthropology. As one astute commentator summarizes the difference, whereas Heidegger presents the human "as a means of access to the mysterious ground of all that is, as an opening or clearing for Being," Ortega is "content to transform human life itself into the radical reality or foundation." ¹⁸

It is nevertheless crucial to note that for Ortega and Heidegger the projection of the human into the world is not a "natural" or "organic" activity as it is with, say, Kapp or Gehlen. Human technics—as opposed to animal technics such as spiderwebs, bird's nests, and beaver dams—derive from a radical rupture in the organic or natural world. As Ortega says in "Ensimismamiento y alteración," the long essay that introduces "Meditación de la técnica" and is posthumously incorporated into *El hombre y la gente* (1957),

human beings are technical, are capable of modifying their environment to fit their sense of convenience because they take advantage of every respite that things allow in order to retire within themselves, to enter into themselves and form ideas about the world, about things and their relations to them, to forge a plan of attack upon circumstances, in short, to construct an inner world. From this inner world they emerge and return to the outside. But they return ... with *selves* they did not have before ... in order to impose their wills and designs, to realize in the outside world their ideas, to mold the planet according to the preferences of their interiority.¹⁹

At the same time, this interior world reveals no transcendent solutions to technical problems (Dessauer) nor even Being as *Ereignis* (Heidegger), but only itself, the human reality of estranged worldliness.

Far from losing themselves in this return to the world, on the contrary, human beings carry themselves into the other, project themselves energetically, masterfully, upon things, that is, convert the other—the world—little by little into the human. Humanity humanizes the world, injects it, impregnates it with its

own ideal substance, and it is possible to imagine that, one day in the distant future, this terrible external world will become so saturated with the human that our descendants will be able to traverse it as today we move about within our most intimate selves—it is possible to imagine that the world, without ceasing to be, will become converted into something like a materialized soul, and, as in Shakespeare's *Tempest*, the winds will blow at the bidding of Ariel, the elf of Ideas.²⁰

With such a suggestion, however, Ortega comes close to transforming a humanities philosophy into an engineering philosophy of technology.

As a further but related aside, one can consider the problem of Heidegger's commitment to National Socialism in contrast to Ortega's antifascism. As Michael Zimmerman (1990) has shown in abundant detail, Heidegger developed a philosophy of technology that unites a reactionary modernism with a view of the historicity of Being. As a result of this union, some critics have argued an essential relation between Heidegger's metaphysics and Nazism. The example of Ortega could, however, serve to qualify such a judgment. Ortega, too, argues a historicist metaphysics and historicist philosophical anthropology, while developing a nuanced critique of many of the weaknesses of culture under the influence of industrial technology—but Ortega was at the same time a resolutely progressive modernist.

Jacques Ellul: Technology as the Wager of the Century

During the same period when Heidegger was formulating the question concerning technology, Jacques Ellul was developing a systematic analysis of "la Technique" as the most important societal phenomenon of the modern world. According to Ellul, capital is no longer the dominant force it was in the nineteenth century; instead it is "technology," which he defines as "the totality of methods rationally arrived at and [aiming at] absolute efficiency (for a given stage of development) in every field of human activity." ²¹

Indeed, it is Ellul's aim to offer for the twentieth century the same kind of orientation toward essentials that Marx's Das Kapital (1867) once provided. As Ellul says in a later autobiographical reflection on that period during which he began studies that would culminate in La Technique (1954): "I was certain . . . that if Marx were alive in 1940 he would no longer study economics or the capitalist structures but technology. I thus began to study technology using a method as similar as

THE UNIVERSITY OF CHICAGO PRESS / CHICAGO AND LONDON

THINKING THROUGH TECHNOLOGY

The Path between Engineering and Philosophy

CARL MITCHAM

Carl Mitcham heads the Science, Technology, and Society Program at Pennsylvania State University.

The University of Chicago Press, Chicago 60637
The University of Chicago Press, Ltd., London
© 1994 by The University of Chicago
All rights reserved. Published 1994
Printed in the United States of America
03 02 01 00 99 98 97 96 95 94 1 2 3 4 5
ISBN: 0-226-53196-1 (cloth)
0-226-53198-8 (paper)

Library of Congress Cataloging-in-Publication Data

Mitcham, Carl.

Thinking through technology : the path between engineering and philosophy $\,/\,$ Carl Mitcham

p. cm

Includes bibliographical references and index.

1. Technology—Philosophy. I. Title.

T14.M56 1994

601-dc20

93-44581 CIP

⊕ The paper used in this publication meets the minimum requirements of the American National Standard for Information Sciences—Permanence of Paper for Printed Library Materials, ANSI Z39.48-1984.

Contents

. . . .

	Prefatory Notes and Acknowledgments		
	Introduction: Thinking about Technology BACKGROUND AND STANDPOINT COLLECTIONS AND CONFERENCES THEMES AND VARIATIONS	1	
Part One	Historical Traditions in the Philosophy of Technology		
One	Engineering Philosophy of Technology Mechanical Philosophy and the Philosophy of Manufactures Ernst Kapp and Technology as Organ Projection Technology and Politics according to Peter Engelmeier and Others Friedrich Dessauer and Technology as Encounter with the Kantian Thing-in-Itself The Intellectual Attraction and Power of the Technical	19	
Two	Humanities Philosophy of Technology Lewis Mumford: The Myth of the Machine José Ortega y Gasset: Meditation on Technics Martin Heidegger: The Question concerning Technology Excursus on Ortega and Heidegger	39	

	Jacques Ellul: Technology as the Wager of the Century		Seven	Types of Technology as Object THE SPECTRUM OF ARTIFACTS Types OF MACHINES	161
Three	From Engineering to Humanities Philosophy of Technology The Two Philosophies in Tension: A Dialogue Two Attempts at Reconciliation The Question of Marxist Philosophy of Technology A Brief for the Primacy of Humanities Philosophy of Technology	62		The Machine (and Object) as Process The Engineering Analysis of Machines Physical, Chemical, and Biological Artifacts Animal Artifacts, Social Artifacts, the Planet as Artifact On the Human Experience of Tools and Machines The Social Dimension of Artifacts Toward a Phenomenology of Artifacts	
Four	The Philosophical Questioning of Technology SCIENCE AND IDEAS TECHNOLOGY AND IDEAS CONCEPTUAL ISSUES LOGIC AND EPISTEMOLOGICAL ISSUES ETHICAL ISSUES ISSUES OF POLITICAL PHILOSOPHY RELIGIOUS ISSUES METAPHYSICAL ISSUES	94	Eight	Types of Technology as Knowledge Cognitive Development and Myth in Technology The Phenomenology of Technical Skill Maxims, Laws, Rules, and Theories Against Technology as Applied Science Cybernetics Ancient and Modern Technology	192
Five	QUESTIONING THE QUESTIONS Philosophical Questions about Techne OBSERVATIONS ON THE HISTORY OF TECHNOLOGY Techne AND TECHNOLOGY PHILOSOPHY OF TECHNOLOGY VERSUS Philosophia Technes	114	Nine	Types of Technology as Activity Technology as Activity The Action of Making The Process of Using Work: From Alienated Labor to "Action into Nature" Again, Ancient versus Modern Technology	209
Part Two	Analytical Issues in the Philosophy of Technology		Ten	Types of Technology as Volition Philosophies of Technology as Volition Volition as a Conceptual Problem in	247
Six	Engineering Objections to Humanities Philosophy of Technology Philosophical Objections to Humanities Philosophy of Technology	137		RELATION TO TECHNOLOGY PHILOSOPHIES OF VOLITION IN RELATION TO TECHNOLOGY TOWARD ETHICS TECHNOLOGY AND WEAKNESS OF THE WILL	
	Two Usages of the Term "Technology" The Extension of "Technology" A Framework for Philosophical Analysis	:		Conclusion: Continuing to Think about Technology THE ARGUMENT REVISITED SCIENCE TECHNOLOGY AND SOCIETY STUDIES	267