

The ninth and final chapter, "Scientists, Science, and Society," is both welcome and appropriate. It represents the ideas and views of a successful scientist and at the level of a sincere fireside chat. However, a discussion of the contributions of Robert Merton and his followers in the sociology of science, who popularized the term "organized skepticism" (as opposed to an unqualified "skepticism," which may conjure up simply "doubting Thomases" in the lay mind), would have improved this section.

It may be of passing interest to mention that the American Physical Society recently engaged a select committee to formulate working definitions of science and scientific research. To date, according to the popular press, the committee remains dissatisfied with its attempts, which reminds us of the difficulties that attend such seemingly simple endeavors.

HYPERKULT: GESCHICHTE, THEORIE UND KONTEXT DIGITALER MEDIEN (HYPERCULT: HISTORY, THEORY AND CONTEXT OF DIGITAL MEDIA)

edited by Martin Warnke, Wolfgang Coy and Georg Christoph Tholen Stroemfeld. Basel & Frankfurt am Main, Germany, 1997. 520 pp. Paper, illus., DM 78.00. ISBN: 3-86109-141-0. (In German)

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Hyperkult: Geschichte, Theorie und Kontext Digitaler Medien discusses hypermedia from the points of view of theoreticians, media practitioners and artists. It presents interesting examples of hypertext as well as fascinating new ideas on the interrelationship between computers and media. It also gives the reader insight into the different meanings of computer-related metaphors such as hypertext, interactivity and the Internet.

The variety of disciplines discussed here—philosophy, literature, music, film and photography—are discussed in essays, historical or theoretical surveys and project descriptions resulting from a series of workshops annually organized by the computer science department at the University of Lüneburg. It is due to the circumspection of the organizers as editors in dealing with the complexity of

crossing borders in the current media debate that the vividness of the workshops is reflected and maintained in the collected writings. The term "hypercult," the title of the workshop series, establishes the cohesion between investigations into areas like medium and machine, program and commutation, and tools and instruments.

Hyperkult is divided into four sections that essentially deal with the interrelationship between the medium in the machine and the machine as medium: computers as media, metaphors of omnidirectional spaces, media machines, and virtual realities. It mainly includes contributions written from a German viewpoint, with the exception of works by artist Arnold Dreyblatt and Danish multimedia expert Peter Andersen. German contributions include those by Wolfgang Coy and Friedrich Kittler on computing, Peter Gendolla and Hartmut Winkler on metaphors, Hubertus von Amelunxen and Joachim Paech on imaging machines, and Joerg Pflueger and Hans-Jochen Metzger on agents and artificial intelligence. The theoretical complexity of the book encompasses two developments in the history and ordering of the sciences: the first is the humanities and its hermeneutics, the second is mathematics (especially computer science). These disciplines are compared to critical readings of metaphors such as hypertext and interactivity as applied to computing processes by which the Internet, human-machine interfaces and artificial life are often characterized. The critical approaches address the shifted use of these categories that derive from either literary theory or biology and that are linked to phenomena of hybridization and hypercult. Conversely, many authors, namely Hans-Jochen Metzger in his survey on artificial life, call for a close examination of environmental conditions, technical requirements and cultural constraints that have to be taken into consideration when we talk about the possibilities and limits of connectivity through digital media.

The editors of *Hyperkult* call for a crossing of the borders between computer science and cultural studies if we want to discuss the ways that the computer can be considered as a medium, in particular a hypermedium. The compendium brings together almost 20 authors from varying disciplines of theory and practice. These theoreticians have developed ways of bridging the gap between discourse and the history and

theories of computers by examining the common ground between them. The collection starts from the assumption that the metaphors we use to describe computers as symbolic machines are too limited to adequately deal with the transformations taking place in digital technologies.

The book surveys critical readings on the philosophy of computing machines, and the authors discuss developments such as hypertext and interactivity to express ideas about accessibility and human-machine interfaces. The investigation introduces a historical dimension through Friedrich Kittler's reminder that when evaluating media technologies we must deal with the effects of the theoretical separation between the humanities and the natural sciences. Kittler argues that the idea of the universal machine, the discussion of boundaries between possibilities and impossibilities, could be illuminated by Heidegger's late writings. Many authors in the book put a strong emphasis on the definition of computers as media. It is Kittler, however, who states more precisely that the emergence of computers involves crossing formal languages on the technological level with such categories as tools and machines. Wolfgang Hagen suggests that we must consider the style of computer languages such that the acknowledged distinction "break-point") between programming and symbolic machines must be redefined in terms of metaphor and metonymy. Discussing computers in terms of media allows for a model of digital media that focuses on processes of transmitting information. This approach is illustrated by digital media in which mathematics are transformed into a perceivable environment.

This book's prime concern with the media in relation to computers lies in digitization and connectivity. As computer scientist Wolfgang Coy puts it, how much will cultural processes and effects be influenced, even transformed, by the structure of the Internet? Certainty about the quality and authenticity of information cannot be achieved in a hypertext system; the transmission of knowledge indicates a break in its production and distribution. Coy observes how systems of knowledge have been transformed into a "culture of footnotes" with the emergence of hypertext and the Net. In this respect, his emphasis on the computer as medium shows the limits of programming by pointing to social and political

effects caused by restructured ordering that dislocates the maintenance of knowledge. With respect to the global shifting of content and context in the Net, it is not at all overstated when Coy says in the introductory remarks that we should not forget that the ordering of knowledge has always been a matter of power and politics. Finally, argues Coy, the computer is only a building block for creating new hypermedia.

In *Hyperkult*, overlapping interests between the humanities and the natural sciences become evident. The essays draw parallels between the history of ideas on interaction in formal systems, the development of intelligent machines and the metaphors for such processes in the humanities. The range of processes, such as construction of hypertexts, development of musical hyperinstruments, occupation with agent theories and debates on artificial life, when viewed together, show that their common point of reference lies within the functions of the hypermedium. *Hyperkult* connects different ways of working with hypermedia, contrasting definitions of the digital machine and giving examples of different applications within media practice. Rolf Grossmann writes about computer music, digital instruments and interactive sound installations, and Peter Gendolla introduces predecessors of hypertext in literature and the arts, especially in modern prose and surrealist collage. The reader will be delighted at this openness of discourse and merging of disciplines that usually do not communicate within the same forum. The diversity of the debate is echoed in the combination of scholarly research and practical applications.

Strikingly, these writings do not show much concern with the appearance of artifacts, such as the shape of artificial-life forms and the bodily figurations of multiple selves in virtual realities. Hubertus von Amelunxen, in his essay, deals with the notion and rhetoric of the photographic image after the age of analog representation; Joachim Paech discusses the distinction between medium and form in relation to problems of figuration and configuration in film, thereby focusing on the paradox of visibility and invisibility—the construction and deconstruction of form in the medium. Apart from these few examples, however, the issue of design and imaging seems to be of little importance to the hypercult debate in this collection. More strikingly, the whole

topic of gender and body that has become an important issue in the international debate on new technologies is absent. Further, the contributions in the book, without exception, are conceived from a male point of view. This may give the false impression that there are no women in the field and should be corrected in a second volume. Despite these limitations, however, the editors deserve credit for an entirely readable volume that provides an overview on the German discourse.

LES PARTICULES ELEMENTAIRES

by Michel Houellebecq. Flammarion, Paris, France, 1998. 392 pp. ISBN: 2-08-067472-2. (In French)

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This novel is stirring a raging debate among French intellectuals this fall, most recently in the pages of *Le Monde* newspaper. The novel tells the story of two half-brothers—both baby-boomers—and traces their family and their amorous and professional stories. One of the brothers, the lead protagonist, is a molecular biologist, while the other seeks resolution through sexual pleasure. The novel is a fast read, and through the vignettes and embedded philosophical musings it provides a biting critique of contemporary society. It attacks the 1968 generation, both those now in positions of power and authority as well as the New-Age outgrowths of the Californian Esalen Institute and the Summer of Love; it attacks the new humanists, the French intellectuals of postmodern and deconstruction schools (Foucault, Derrida, Lacan, Deleuze and gang) as well as the neo-socialists. Indicative of the cynical view of the book is that most of the lead characters end their lives as suicides or in insane asylums.

The sometimes purple prose is laced with scientifically accurate descriptions of human biology, psychology and anatomy, with a particular relish for describing the effects of aging and the emptiness and alienation of much of contemporary life. It is merciless on the fragmentation of society (for example, 40 percent of French children are born out of marriage). The protagonists fail

to develop any meaningful long-term relationships with their spouses, children, relatives or friends (hence the book's title, "Elementary Particles").

The novel may be of interest to *Leonardo* readers for two reasons related to the current "Art and Biology 30th Anniversary" theme: first, the lead protagonist is a molecular biologist and the book presents a convincing and realistic, if sarcastic and depressing, view of the life and work of scientists. The discussions of the impact of Einsteinian relativity, quantum mechanics, chaos theory and molecular biology are well thought out and interesting. There are perceptive anecdotes, for instance, about the Huxley brothers, Julian and Aldous, and about Neils Bohr and the Copenhagen School. The underlying thrust of the novel is that the advance of scientific knowledge has been steadily removing the various underpinnings of philosophical and ethical systems, resulting in a materialist impasse. The book, however provides a rather surprising and provocative denouement: the molecular biologist, Michel Djerzinski, develops a theory (which is then published in the journal *Nature*) based on thermodynamic principles that demonstrates that all evolution based on chromosomal separation (i.e. sexual reproduction), is inherently unstable (and hence, imperfectible). In a second paper, he demonstrates and confirms, through numerical simulations, that any genetic code, whatever its complexity, can be rewritten through a formal mathematical procedure so that it is structurally stable, resistant to alteration through mutations, and infinitely extensible through asexual cloning. True ethical humanism, he demonstrates, can only be achieved through genetically based brotherhood, or rather sisterhood. UNESCO funds the development of the creation of the new beings using the Djerzinski algorithm, an event that is televised live like the moon landing, or like Sojourner landing on Mars.

The novel ends optimistically through the eyes of the new race of ethical beings that have been created and is dedicated to the human race that had the courage to end its own flawed existence, through rational and scientific means. The premise of the book, familiar to the science-fiction audience, is developed in a thorough and effective way—a foretaste of the profound ways that molecular biology