

Writing Machines
N. Katherine Hayles
designed by Anne Burdick

IN *WRITING MACHINES*, N. KATHERINE HAYLES EXPLORES HOW LITERATURE HAS TRANSFORMED ITSELF FROM INSCRIPTIONS RENDERED AS THE FLAT DURABLE MARKS OF PRINT TO THE DYNAMIC IMAGES OF CRT SCREENS, FROM VERBAL TEXTS TO THE DIVERSE SENSORY MODALITIES OF MULTIMEDIA WORKS, FROM BOOKS TO TECHNOTEXTS. HAYLES WEAVES TOGETHER INTELLECTUALIZED THEORY AND PSEUDO-AUTOBIOGRAPHICAL NARRATIVE, THE CULTURES OF SCIENCE AND THE HUMANITIES, AND THROUGH HER COLLABORATION WITH ANNE BURDICK, THE MANDATES OF WRITING AND DESIGN. HAYLES INAUGURATES MEDIA SPECIFIC ANALYSIS IN LITERARY STUDIES, INVESTIGATING WORKS THAT FOCUS ON THE VERY INSCRIPTION TECHNOLOGIES THAT PRODUCE THEM. SHE ANALYZES THREE WRITING MACHINES IN DEPTH: TALAN MEMMOTT'S GROUND-BREAKING WEB HYPERTEXT *LEXIA TO PERPLEXIA*, TOM PHILLIPS'S ARTIST'S BOOK *A HUMUMENT*, AND MARK Z. DANIELEWSKI'S POSTPRINT CULT NOVEL *HOUSE OF LEAVES*. HAYLES SPECULATES ON HOW TECHNOTEXTS AFFECT THE VERY DEVELOPMENT OF CONTEMPORARY SUBJECTIVITY ITSELF. WITH THIS POLEMICAL LITTLE BOOK, HAYLES MAKES THE CASE THAT THINKING ABOUT LITERATURE

"Kate Hayles reads with real attention and attention to the real, attending to electronic literature and hybrid verbal/visual forms with an eye to the materiality and mediality at their heart."—Michael Joyce

WITHOUT THINKING ABOUT MATERIALITY ISN'T REALLY THINKING AT ALL.

"*Writing Machines's* is a major addition to the scholarship on hypertext and, in general, on the relation of technology to literature. As this volume so clearly demonstrates, Hayles is a subtle reader of texts, a knowledgeable critic of new technology, and a fine theorist of culture... I am certain readers of *Writing Machines* will place it near the top of their list of books on hypertext."—Mark Poster, University of California, Irvine

"In the age of the immaterial, *Writing Machines* compellingly argues that all forms of literature are inescapably material. Through Burdick's melding of graphic evidence and Hayles' weaving of critical and biographical perspectives, *Writing Machines* deftly embodies its subject while disrupting our expectations about academic publishing."—Andrew Blauvelt, Design Director, Walker Art Center

N. KATHERINE HAYLES IS PROFESSOR OF ENGLISH AND DESIGN | MEDIA ARTS AT THE UNIVERSITY OF CALIFORNIA AT LOS ANGELES. SHE IS THE AUTHOR OF *HOW WE BECAME POSTHUMAN: VIRTUAL BODIES IN CYBERNETICS, LITERATURE, AND INFORMATICS*. ANNE BURDICK TEACHES IN THE MEDIA DESIGN PROGRAM AT ART CENTER COLLEGE OF DESIGN AND IS THE DESIGN EDITOR OF *EBR*, THE ELECTRONICBOOKREVIEW.COM.

WRITING MACHINES

N. KATHERINE HAYLES

MEDIAWORK PAMPHLET SERIES
THE MIT PRESS MITPRESS.MIT.EDU
MASSACHUSETTS INSTITUTE OF TECHNOLOGY
CAMBRIDGE, MASSACHUSETTS 02142

MEDIAWORK



Writing Machines

N. Katherine Hayles

DESIGNER
Anne Burdick

EDITORIAL DIRECTOR
Peter Lunenfeld

Adriano de Souza - illu
fall 02

MEDIAWORK
The MIT Press
Cambridge and London
MITPRESS.MIT.EDU/MEDIAWORK

Title Page

Table of Contents

Preface

3
4

CHAPTER 1 Media and Materiality

8

CHAPTER 2 Material Metaphors, Technotexts,
and Media-Specific Analysis

18

CHAPTER 3 Entering the Electronic Environment

34

CHAPTER 4 Electronic Literature as Technotext:
Lexia to Perplexia

46

CHAPTER 5 Experiencing Artists' Books

64

Lexicon Linkmap

CHAPTER 6 *A Humument* as Technotext:
Layered Topographies

72

76

CHAPTER 7 Embodiments of Material Metaphors

100

CHAPTER 8 Inhabiting *House of Leaves*

108

Source Material

Endroduction

Designer's Notes

Author's Acknowledgements

Colophon

132
138
140
142
144

Kaye was standing in a UCLA gallery, transfixed by an event that all teachers worth their salt dream about—the moment when her students not only surpassed her expectations but leaped ahead of what she herself could have done. She was watching Adriana de Souza e Silva and Fabian Winkler demonstrate their installation *database*. It was their final project for a graduate seminar on word and image in the digital domain, an experimental course she was co-teaching with Bill Seaman, an electronic artist from the Design | Media Arts department. The idea had germinated more than a year earlier, when she and Bill fantasized about a course that would explore the interaction of electronic word, image, sound, and animation. They hoped to combine their complementary expertise to think deeply about the interplay between verbal and nonverbal components in electronic literature and art. Moreover, they strategized about bringing two groups of graduate students into conversation and collaboration with one another: those from literature departments, who excelled in the close reading of difficult texts but often did not have high technical competence or extensive visual skills, and those from Design | Media Arts, who were visually sophisticated and had technical chops but often quailed at reading hundreds of pages of dense theoretical texts. Seminar discussions had been intense, insightful, and rewarding, and the students had caught fire as they planned their final projects.

Adriana and Fabian had taken off on the idea that the materiality of the technology should be brought into visibility, an enterprise they undertook by reversing and subverting its usual operations. The installation consisted of a computer screen displaying virtual text, a printer with a miniature video camera attached, and a projection screen displaying the camera's output. Sitting in the printer were sheets of paper full of text, the exterior database for the project. When the user moves the cursor over the white computer screen, black rectangles appear that cover over most of the text, along with keywords that fade into white again when the cursor moves away—unless the user chooses to click, in which case the

keyword is also covered by a black rectangle. At the same time, the click sends a message to the camera to focus on a second keyword in the exterior database related to the first through agonistic relation, perhaps an antonym or some other oppositional tension. For example, clicking on "perpetually" on the screen makes "too fast" appear on the wall projection; the screenic "promise" links to the projected "past." After a few clicks, the screen is dotted with black rectangles. The user can then click on a red dot at the upper right corner to activate a "print" command. The printer sends through the sheet full of pre-written text, blacking out the keywords chosen by the user as the camera gives a fleeting glimpse of them before they disappear. At the same time, the obliterations create alterations in the database's linear narrative text that change its meaning.

Adriana and Fabian's accompanying essay made clear the project's complexity. The inversions bring into visibility a range of assumptions normally so taken for granted they are invisible. The printer obliterates rather than inscribes words; the database is stored as marks on paper rather than binary code inside the computer; clicking blacks out visible words rather than stabilizing them; the camera "reads" but does not record; and the projection displays words oppositional to the ones the user has chosen. The inversions create new sensory, physical, and metaphysical relationships between the user and the database. Printing, a technique normally associated with external memory storage, transforms presence into absence. The video camera, usually linked with storage technologies that make a permanent record, here makes writing ephemeral and transitory, disappearing from the projection as the word is inked out. The database, rather than residing at physically inaccessible sites as bit strings dispersed throughout the hard drive, is here constituted as linear text Kaye could literally hold in her hands.

The significance of these inversions is broadened by the prose constituting the database, selected from various writers meditating on time and memory, including Borges's "The Immortals." In this fiction, the narrator is searching for the City of Immortals. He discovers a tribe of troglodytes, seemingly subhuman creatures that cannot speak, do not sleep, and eat barely enough to keep alive. The narrator decides to teach one of them to speak, only to discover that the creature is the poet Homer. Following Borges's logic, Adriana and Fabian point out that immortality drastically alters one's relationship to time. Since time for an



immortal stretches in an endless horizon, the future ceases to have meaning; the future is precious for mortals because they understand their lives have finite horizons. The immortals, by contrast, live in a present that obliterates the past and devours the future, becoming absolute, permanent, and infinite. Saturated by memories stretching into infinity, the immortals become incapable of action, paralyzed by thoughts that have accumulated through eons without erasure. Seen in light of this story, the obliterations the printer creates can be read as inscriptions of mortality, non-signifying marks that paradoxically signify the ability to forget, a capability the immortals do not have.

Just as the printer plays with time by linking inscribing/obliterating with immortality/mortality, so the wall projection plays with time by linking writing/speaking with visibility/invisibility. The words projected on the wall function as visible inscriptions, but inscriptions that behave like speaking since they disappear as the printer inks out the selected word. Writing, a technology invented to preserve speech from temporal decay, here is made to instantiate the very ephemerality it was designed to resist. Kaye understood that her relation to this writing was being reconfigured to require the same mode of attention she normally gave to speech. If her thoughts wandered and her attention lapsed while she was listening to someone speak, it was impossible to go back and recover what was lost, in contrast to rereading a passage in a book. Moreover, the wall projection did not repeat the word she selected on screen but rather substituted another word orthogonally related to it. Blacked out as soon as she clicked on it, the screen word became unavailable to visual inspection. She could "remember" it only by attempting to triangulate on it using the projected word, which required her

to negotiate a relationship constructed by someone else through the fields of meaning contained in the database. But as soon as she printed the database out, it was altered by the printer obliterating the words she had selected, which also changed the meaning of the narrative that provided the basis for the relationship between screenic and projected words. Thus she was placed in the position of trying to negotiate meanings whose significances were changed by her attempt to understand them. Cagey, she thought, very cagey. Not to mention a stunning interrogation of the assumptions that underlie our acts of reading and writing.

What does it mean to "do" theory? As practiced in the sciences, theory distills from experience a few underlying regularities, thus reducing a seemingly infinite number of particularities into a parsimonious few. The more instances that can be reduced, the more powerful the theory is understood to be. Because the noise of reality cannot be so easily tamed, scientific theories always exist in tension with experimental data. Deviation from theoretically predicted results is the mark of the real, the inscription of interacting complexities that may rarely or never be completely eliminated. The point of experimental practice is to reduce this noise as much as possible. Reduction is good, proliferation is bad.

Theory in literature has related meanings but different cumulative effects. Here theory serves as an interpretive framework through which particular instances of literary texts can be read. Like scientific experiments, texts may rarely or never be completely explained by a given theory; there will always be elements that resist incorporation into a theoretical matrix. Unlike scientific theory, however, the more predictive power a literary theory seems to have, in which it yields readings that can be known in advance once the theory is specified, the less valuable it becomes. At this point literary scholars tend to feel the theory has become reductive in a bad sense, because it represses the text's power to generate new meanings and so to renew itself. Here reduction is bad, proliferation good.

Years ago I proposed an economic interpretation for this difference, suggesting that whereas science can renew itself by continually opening new realms of phenomena for investigation, literature is in the very different position of having an established canon of a finite number of texts. While some new frontiers can be opened by expanding the canon or, in the case of contemporary literature, adding to it through new works, it is unlikely that there will ever be new plays by Shakespeare or new medieval texts to study. "Too many critics, too few texts" was the way I expressed this situation, leading to a dynamic in which the economics require that old texts must be capable of being read in new ways if literary scholars are to publish new research. The inexhaustibility of texts thus comes to have an economic value very different from the noise of experimentation in science. Rather than trying to eradicate noise, literary scholars have a vested interest in preserving it. When literary theories become sufficiently established that they threaten to make this noise invisible, they cease to have the same utility for critics and will normally be employed in different ways. They are then less likely to be seen as interpretive frameworks dictating entire readings than to be regarded as one tool among many, used for discrete passages or momentary insights but rarely the central focus of a critical argument. Literary theories thus have life cycles distinctively different from that of scientific theories (itself a complex topic too extensive to discuss here).

In addition, the ideology of science sees theories as cumulative (or more precisely, subsumptive). Older established theories, for example Newton's laws of motion, must be reconciled with newer theories and folded into them, as when mechanics is established as a limit case to quantum mechanics. Although it is a moot point whether this is a smooth folding or a rupture covered over by changing what key terms mean, nevertheless it is fair to say that the cumulative effect of theory building is greater in science than in literature. This difference too gives literary theories sharper and more well-defined life cycles than scientific theories.

Anecdotal evidence has a shifting value for literary theory that varies according to where in the life cycle it comes. Particularity weighs in most heavily at the beginning of theory formation, when it gives vividness and heft to theory's generalizations, and near the end of the cycle, when it often serves to unravel a theory or force it to reorganize at a higher level of complexity. At the moment, we are near the beginning of a theory of media-specific analysis in literary studies. Many people, Kaye thought, are now making journeys similar to hers, moving from print-oriented perspectives to frameworks that implicitly require the comparison of electronic textuality and print to clarify the specificities of each. Others have yet to begin the trip, remaining firmly within print and seeing electronic textuality as a subset of print or as something still too distant to be an important consideration. For these folks, theory might provide the best catalyst for re-thinking their perspective, since they do not yet have the experiences that would *make electronic textuality an everyday part of their lives. Theory, with generalizations distilled from personal encounters with texts, can stimulate scholars to read old texts in new ways and seek out new texts that cannot be adequately understood without the theory. Maybe now is a good time for a double-braided text where the generalities of theory and the particularities of personal experience can both speak, though necessarily in different voices. A text where both voices can be heard, at first very different but then gradually coming closer until finally they are indistinguishable.*

Just as image and text, materiality and content, have entwined both in the narrative and theoretical chapters, so now the two voices of personal experience and theoretical argument merge as Kaye's cumulative experience leads her to the theoretical concepts articulated at the start of this book. The end is in the beginning, and the beginning is in the end. Kaye's laboratory experiences, her first disciplined encounter with materiality, no doubt predisposed her to realize that books are more than encod-

ed voices; they are also physical artifacts whose material properties offer potent resources for creating meaning. Indeed, it is impossible not to create meaning through a work's materiality. Even when the interface is rendered as transparent as possible, this very immediacy is itself an act of meaning-making that positions the reader in a specific material relationship with the imaginative world evoked by the text.

The database project makes this unmistakably clear by positioning the database of verbal signifiers within a complex semiotic-material apparatus that integrates the words with a series of machine interfaces that materially affect their meaning. Moreover, through its rigorous interrogation of the ways in which users interact with the interfaces, it also makes clear that subjectivity is an emergent property produced in part by the work's materiality. The interplay between semiotic components and physical attributes that gives rise to materiality simultaneously and with the same gesture gives rise to subjects who both perceive and are acted upon by this materiality.

In the broadest sense, artistic practice can be understood as the crafting of materiality so as to produce human-intelligible meanings, while at the same time transforming the meaning of terms like "human" and "intelligible." A critical practice that ignores materiality, or that reduces it to a narrow range of engagements, cuts itself off from the exuberant possibilities of all the unpredictable things that happen when we as embodied creatures interact with the rich physicality of the world. Literature was never only words, never merely immaterial verbal constructions. Literary texts, like us, have bodies, an actuality necessitating that their materialities and meanings are deeply interwoven into each other.