

## Introductory Comments

N. Katherine Hayles's *How We Think: Digital Media and Contemporary Technogenesis* (2012) embodies *Kairos*'s mission: "exploring the intersections of rhetoric, technology, and pedagogy." It entwines the tensions and possibilities of media, humanity, literature, cognition, attention, history, reading, and education. Hayles forges these connections by alternately delving into theoretical perspectives and analyzing concrete manifestations of abstract concepts. Additionally, *How We Think* performs its own argument, engaging the premises and processes proposed within the text.

## Chapter Summaries

### 1: How We Think: Digital Media and Contemporary Technogenesis

Hayles begins with a conceptual and historical foundation for *How We Think*, addressing the challenges, resistances, and potentialities of forging stronger connections between humans and technology, particularly in the traditional humanities and social sciences. She “explores the proposition that we think through, with, and alongside media” (p. 1). The theoretical, cultural, pedagogical, and physiological connections between humans and technology are the threads that extend throughout the book.

Hayles initiates the conversation by offering two ways to begin the integration of technology into resistant fields of study. First, she asserts, “Comparative Media Studies provides a rubric within which the interests of print-based and digital humanities scholars can come together to explore synergies between print and digital media” (p. 7). This acts as the foundation of her discussion on the synthesis of the traditional and digital humanities in terms of changes in pedagogy, publication, and research. Second, she explains “the concept of technogenesis, the idea that humans and technics have coevolved together” (p. 10). In this recursive evolutionary

concept, a genetic change leads to a change of the environment (or technology), which, in turn, accelerates new genetic change (pp. 10-11).

She furthers this argument by using embodiment as a way to explicate how we as human beings have both physical and mental extensions of our bodies into technology. Whether we care to admit it or not, we are always, already a part of technology and it is a part of us; technology is inextricable from the evolutionary process.

This chapter then highlights the central concepts that are addressed throughout *How We Think*: media, technology, humanities studies, attention, reading,

temporality, narrative, database, and spatiality. She hints at her engagement with these concepts through a variety of objects and texts including telegraph code books, mapping technology, and multi-modal literature. Conclusions from the analyses of these artifacts are synthesized, not as a claim for the ultimate benefit of connecting humans and technology, but rather, to further the line of inquiry. As Hayles explains, “People—not technologies in themselves—will decide through action and inaction whether an intervention such as this will be successful” (p. 18).

### **First Interlude: Practices and Processes in Digital Media**

Digital technologies are changing the landscape of the humanities fields. Scholars must reorient themselves as professionals within the field and through their visions of future possibilities. As we move into an age when the humanities are hybridized with technology and science, and reading is accepted in all of its forms, a balance of print-based and digital becomes both difficult to achieve and exceedingly fruitful. This balancing act revolves around perspectives on reading and attention within the humanities and extends into a greater cultural context.

## **2: The Digital Humanities: Engaging the Issues**

The Digital Humanities have a unique challenge of being related, and yet separate from the Traditional Humanities. Digital Humanities, a field of study that started in the 1940s, have progressed in waves: the first focused primarily on quantitative work, the second on qualitative work, and the current trend on coding, multimodality, and analysis (p. 23). Although it is not a new phenomenon, the coexistence of the Digital Humanities with the Traditional Humanities has continued to be uneasy. The Digital Humanities have “their own challenges and limitations” and “it is not that it is better (or worse) but rather different, and the differences can leverage traditional

assumptions so they become visible and hence available for rethinking and reconceptualizing” (pp. 23-24, emphasis in original).

The transformations inspired by the Digital Humanities include “scale, critical/productive theory, collaboration, databases, multimodal scholarship, code, and future trajectories” (p. 24). The Digital Humanities focus more on databases and collaboration than the Traditional Humanities; thus, the field excels at expanding the scale of the research, the scope of the projects, and the inclusion of a range of contributors. However, this also introduces a set of challenges

including the context, storage, access, and dissemination of knowledge produced and synthesized through Digital Humanities research.

With this in mind, there are two possible routes for including the Digital Humanities in the mainstream fields of study: assimilation and distinction (p. 46). In the former, the Digital Humanities are included as part of the Traditional Humanities. The two fields work simultaneously to create knowledge. However, the Digital Humanities generally take a back seat in this model. The Traditional Humanities supposedly do the “real” work and the Digital Humanities merely assist. In

the latter, the Digital Humanities are a unique field of study, separate from the Traditional Humanities in focus, location, and funding. Hayles suggests that we rethink this tension as an asset in order to revitalize the Humanities as a whole.

### **3: How We Read: Close, Hyper, Machine**

This chapter concretely explores different ways of thinking by looking at three styles of reading. In addition, Hayles develops “a theory of embodied cognition encompassing conscious, unconscious, and nonconscious processes” (p. 55). Close reading is synonymous with the Traditional Humanities. It requires focus and

attention that is prized by the discipline. In contrast, the majority of students in the current generation are more adept at hyper reading than close reading. These students are capable of browsing web content, social media, and visual information at an astounding rate. However, they are not necessarily capable of analyzing this information closely. Finally, machine reading adds another layer to the reading processes. More often, research requires a phenomenal amount of data that cannot reasonably be reviewed by a single human being or even a collaborative group. Machine reading allows for the isolation and identification of patterns that would

otherwise go unnoticed in the contexts of either hyper or close reading. Hayles recommends an inclusive and balanced approach to these reading techniques. Each has its strengths, but the reader must identify the best use and context for each reading style.

### **Second Interlude: The Complexities of Contemporary Technogenesis**

Hayles explains, “Contemporary technogenesis is about adaptation, the fit between organisms and their environments, recognizing that both sides of the engagement (humans and technologies) are undergoing coordinated transformations” (p. 81). This provides a framework for the

previous and upcoming chapters, which serve as support and evidence of the coevolution of humans and technology.

### **4: Tech-TOC: Complex Temporalities and Contemporary Technogenesis**

The theoretical discussion begins with the complex temporalities surrounding both technical and human beings by engaging the question: “What would it mean to talk about an object’s experience of time, and what implications would flow from this view of objecthood?” (p. 86). The coevolutionary link already drawn between human and technical beings allows for a discussion of the developmental changes of technics.

Skeuomorphs, for example, reveal the “enfoldings—past nestling inside present, present carrying the embryo of the future—[that] constitute the complex temporalities that inhabit technics” (p. 89). This perspective leads to a discussion of materiality and attention, as well as the interfaces between humans and technics.

As a concrete example of this human-technic interface, Hayles analyzes the complex temporalities that exist for both humans and technology in Steve Tomasula’s *TOC: A New-Media Novel* (2009). These temporalities are part of both the construction and the experience of *TOC*, which ultimately

reveal that humans measure time but are also products of this regulation (p. 115). The layered storylines and characters each add a slightly different perspective; Chronos and Logos, a pregnant woman, and a comatose man all force the reader to consider the subjectivity of time. In addition, *TOC*, itself, was constructed by a number of collaborators, each working from a different perspective at a different time. The “patchwork” nature of the text is testament to the variability of velocity, direction, construction, and process of temporality (p. 120). The intersection between technology and humanity in *TOC* concretizes their codependence and reveals new pathways for

synthesizing an understanding of time and story. Finally, the discussion of temporality alludes to the related concepts of spatiality and narrative that are explored in later chapters.

### **5: Technogenesis in Action: Telegraph Code Books and the Place of the Human**

The coevolution of human and technical beings often has “the effect of reengineering environments so as to favor further changes” (p.123). One such example is the telegraph code book, which is particularly useful because, decades after the height of its use, it is possible to retrospectively view the changes it initiated. Humans developed the telegraph, but in order

to use it effectively, humans had to also adapt to the technology. Telegraph operators used a language specific to the telegraph, hence the publication of the code books. These codes, with repetitive use, gradually caused changes in the neural pathways of the human brain (p. 128). Ultimately, Hayles asserts that the telegraphs and code books are the precursors to modern computer code (p. 146) and, ironically, the modern computer provides the means to research and understand its ancestor (p. 158). Telegraph code books provide a concrete perspective of the “struggle to define the place of the human in relation to digital technologies” (p. 170).

### **Third Interlude: Narrative and Database: Digital Media as Forms**

Databases are changing the way humans approach research practices. These mines of information allow researchers to investigate new possibilities in the crossover between database and narrative. Hayles introduces “spatial history” versus “narrative” history (p. 171), geographic information system (GIS) and global positioning system (GPS) technologies, and relational versus object-oriented databases (p. 172). She also highlights two experimental texts for further analysis: Steven Hall’s *The Raw Shark Texts* (2007) and Mark Z. Danielewski’s

*Only Revolutions* (2006). Each of these texts bridges the gap between narrative and database. In addition, *Only Revolutions* lends itself to a machine reading. These texts and technologies constitute relevant avenues of research that are hinted at earlier in *How We Think*.

### **6: Narrative and Database: Spatial History and the Limits of Symbiosis**

Hayles claims, “Whereas database allows large amounts of information to be sorted, catalogued, and queried, narrative models how minds think and how the world works” (p. 179). Narrative is inherently temporal while database is inherently spatial; however,

these frameworks have a symbiotic relationship or entwinement (p. 181). Spatial history exemplifies this overlap, making maps represent meaning and movement rather than just location. This line of inquiry continues with a description of the coordination between “object-oriented programming languages” and “relational databases,” or by using object-oriented databases (pp. 193-194). These combinations allow for a representation of a greater complexity of information. In this way, “spatial history demonstrates the transformative power that digital technologies can exert on a traditionally print-based field” (p. 197). Narratives

and databases create a tension between standardization and story.

## **7: Transcendent Data and Transmedia**

### **Narrative: Steven Hall's *The Raw Shark Texts***

Steven Hall's *The Raw Shark Texts* “performs the power of written words and reveals the dangers of database structures” (p. 200). Hayles analyzes the synthesis of narrative and database in *The Raw Shark Texts* in terms of (de) contextualization of data, presence or absence of a speaker, and flexibility of format (p. 202). *The Raw Shark Texts* magnifies and interrogates these binaries through concrete villains in the narrative. Mycroft Ward “represents the complete separation of form and

content” whereas the Ludovician shark “embodies the complete fusion of form and content” (p. 205). These villains propel the reader into an immersive fiction that can be viewed as both positive (the goal of narrative) and negative (dangerous to the reader). Part of this immersion stems from an encryption of the text that disrupts the narrative flow but draws the reader into the text through active participation. The *Raw Shark Texts* also furthers its multimodality through fragments of data scattered online (p. 212). Finally, *The Raw Shark Texts* includes an inversion referred to as un-chapters (or negatives) with an undex, which also forces the reader to choose between

parallel endings. *The Raw Shark Texts* mediates between narrative and database, hinting at the potential “for a future in which humans, as ancient as their biology and as contemporary as their technology, can find a home” (p. 219).

## **8: Mapping Time, Charting Data: The Spatial Aesthetic of Mark Z. Danielewski’s *Only Revolutions***

Mark Z. Danielewski’s *Only Revolutions* explores a transformational “shift from narrative as a temporal trajectory to a topographic plane upon which a wide variety of interactions and permutations are staged” (p. 221). Although it is a narrative, built on

poetic language, the constraints of format and content suggest the structure of database. *Only Revolutions* can be read in “octets” (p. 224), rotating the book every eight pages in order to read text that is initially upside down; in addition, there are “prohibitions on words and concepts,” rotating lists of data, “chronological lists of entries,” permutations of terms throughout the text, and specific word and line counts (pp. 224-226). The additional thread of historical events that runs along the center of each page also complicates the narrative and lends itself to data analysis as it both forms and informs content. These patterns “emerge from an ocean of data” and provoke active

participation as the reader engages text and memory simultaneously (p. 230). Like Hall’s novel, *Only Revolutions* is an inversion of another text; Danielewski chose to write the mirror of his first novel, *House of Leaves* (2000). The endpapers of *Only Revolutions* concretely display topics that are forbidden because they appeared in the previous text.

These limitations and structures ideally situate *Only Revolutions* for a machine reading, which is described in the coda. It is the ultimate synthesis of print and digital. Hayles concludes that experimental works illustrate technogenesis and should promote “a

renewed sense of the richness of print traditions even as they also begin to exploit the possibilities of the digital regime” (p. 247). Her argument circles back to the beginning, an insistence that the Humanities does not have to choose between grasping onto the print-based past or the digitized future; rather than focus on either/or, inquiry into humanity and technology should delve into the complexities of both/and.

## **Beyond the Text**

I was initially baffled by the notion that I was reading about the coevolution of humanity and technology in a print, paperbound book. However, Hayles creates a multi-dimensional text by

bridging the gap between print and digital. She provides *How We Think: A Digital Companion* so readers have access to the same data used to craft the print-based text. Readers then have the option to test Hayles’s hypotheses and conclusions or synthesize the data in a new way.

## **Interviews on the Digital Humanities**

Hayles interviewed extensively to support her analysis of the Digital Humanities and has made the interviews available to the reader. Clicking on an interview link opens the full audiovisual file as well as a list of themes. Clicking on a particular

theme skips to the relevant part of the interview.

### **Telegraph Code Books**

This section provides an extensive collection of telegraph code books (well over 100) used to write Chapter 5 in *How We Think*. As she describes, the telegraph code books provide a concrete foundation for understanding the coevolution of humans and technics. These code books are made more concrete and accessible by linking them online for readers' perusal. Hayles also includes options for searching the code books, the top 300 words contained in the books, and plain text for use in machine reading.

### **Mark Z. Danielewski's *Only Revolutions***

Hayles includes links to commentary and materials related to *Only Revolutions* so readers may supplement their understanding of Danielewski's text in the context of her argument. The lists of animals, plants, minerals, and cars from *Only Revolutions* particularly supplement the assertions in *How We Think* and allow the reader to draw conclusions independently. The images of the end papers and maps are also much clearer online than in the print-based text and are available for further analysis.

### **Closing Remarks**

N. Katherine Hayles's *How We Think* disrupts the popular notion that there is a technological split between generations or between fields of study. In fact, we have all been raised with technology because, like us, it has evolved over time. Hayles thoroughly supports her argument for technogenesis, providing concrete examples of the coevolution of humans and technics. She also explores the nuanced construction of temporality, spatiality, narrative, and database that occurs at the interface between human and technological beings. Whether or not we are prepared to welcome this intersection into our lives and work, it is already present and inextricable.

The theoretical background and careful synthesis of research provides a platform for understanding this connection, especially for readers who already feel confident using and thinking about technology. For readers who feel more aligned with print-based texts and traditional fields of study, the concrete examples may be accessible, but the depth of analysis and bombardment of data may feel overwhelming. However, despite the swirling maelstrom of technology, evolution, and human potentialities in *How We Think*, I always seemed to surface with Hayles as my guide.