Review Essay: Making Our Brains

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Davidson, Cathy N. *Now You See It: How the Brain Science of Attention Will Transform the Way We Live, Work, and Learn.* New York: Viking, 2011. Print. 342 pages.

Hayles, N. Katherine. *How We Think: Digital Media and Contemporary Technogenesis.* Chicago: U of Chicago P, 2012. Print. 280 pages.

Malabou, Catherine. *What Should We Do with Our Brain?* Trans Sebastian Rand. New York: Fordham UP, 2008. Print. 94 pages.

As I read the three books under review here, I realized that today's research portrays a very different brain from the one conceptualized in what used to be called cognitive studies. *Then* the brain was envisioned as a hard-wired entity with distinct areas named and claimed like colonial territories—Broca's Area, Primary Motor Cortex, Wernicke's Area and so on. Researchers like Linda Flower and John R. Hayes, Carl Bereiter, Marlene Scardamalia, Robert de Beaugrande, Lee Odell, Lee W. Gregg and Erwin R. Steinberg drew on this view of the brain to show how cognitive studies could inform the teaching of writing. *Now* the brain is described in terms of plasticity, with emphasis on its capacity for growth, interconnections, and regeneration. The authors whose books I discuss take a variety of perspectives, but they all reject the hard-wired view in favor of neuroplasticity. This newer view of the brain is more than metaphorical; it represents the current state of brain research, and this research has implications for those of us who develop and teach in writing programs.

Recent brain research has been paralleled by the development of digital technologies, so it is not surprising that some considerations of neuroplasticity include technologies as well as learning, scholarship, and teaching. N. Katherine Hayles' book, *How We Think,* a richly textured and impres-

sively researched project, puts *technogenesis,* or the idea that humans and machines are co-evolving, at the center, and asks us to think carefully about the relationship between our own and our students' brains as well as the digital writing tools we are all using. In Hayles' view, the machines we create (re)make us, both cognitively and physically: "The more one works with digital technologies, the more one comes to appreciate the capacity of networked and programmable machines to carry out sophisticated cognitive tasks, and the more the keyboard comes to seem an extension of one's thought rather than an external device on which one types" (3). Drawing on studies of changes in brain morphology and functioning, Hayles offers clear evidence of this relationship between brains and digital tools.

Furthermore, she connects this concept with the observation from evolutionary biology that epigenetic changes, "changes initiated and transmitted through the environment rather than through the genetic code," can be "accelerated by changes in the environment that make [humans] even more adaptive, which leads to further epigenetic changes" (10). In this view, the brain (re)making that results from the use of digital technologies can become part of an increasingly rapid cycle of change. This merits attention from those of us interested in writing. What can we learn, for example, when the interactions of eye, hand, and brain that we have long associated with writing become—with the use of voice recording software—technologically facilitated interactions of eye, *voice,* and brain?

Hayles expands her argument by looking at the relation between the human and the technological in the case of telegraph code books to show "the connections between epigenetic changes in human biology, technological innovations, cultural imaginaries, and linguistic, social, and economic changes" (123). Code books, which were developed by most major industries and the military from the mid 19th to the mid 20th century, compressed key phrases into a single code word, sometimes for economy and sometimes for secrecy. As Hayles shows, code construction became increasingly algorithmic, pointing "toward a dematerialized view of information that would . . . find expression in the idea that human minds *already* exist as dematerialized information patterns and so can be uploaded to a computer without significant loss of identity" (151). At the same time, Hayles acknowledges that determining the relation of the human to digital technologies remains an ongoing struggle. Writing instructors contend with this struggle in a number of ways, perhaps none more pressing than in the machine scoring of writing.

The tension between databases and narrative also receives attention from Hayles, and she shows how the latter resists the standardization of the former, but at the same time demonstrates how narrative can become more

machine-centric when authors deploy "software programs, network func-tionalities, and hardware that provide sophisticated cognitive capabilities including access to databases and search algorithms" that participate in the composition process (236). Always nuanced and scrupulous, Hayles offers compelling evidence that we need to think very carefully about the rela-tionship between brains and the digital writing tools we are using.

In the end, Hayles is deeply concerned about the growing divide between the digital humanities and the traditional humanities, especially in their differing views of theory, collaboration, databases, multimodal schol-arship, and code. She argues that a union of the digital and traditional can help secure the future of the humanities more generally, even as she recog-nizes the difficulty in so doing. A more detailed illustration of this point appears in the chapter titled "How We Read: Close, Hyper, Machine" in which she questions how the close reading long associated with literary study can be reconciled with the skimming, fragmenting, and hyperlink-ing of screen-based hyper reading and with machine reading. The message Hayles leaves with her readers is that close, hyper and machine reading "each have distinctive advantages and limitations; nevertheless, they also overlap and can be made to interact synergistically with one another" (74). This point convinces me especially because I have found it useful to com-bine the quantitative strengths of machine reading with the interpretive features of close reading in assessing student writing.

I have looked at the Hayles book in detail because it makes the most well-grounded argument of the books considered here, and in many ways the others take as givens much of what Hayles carefully explains about brain-making.

Cathy N. Davidson's book, *Now You See It,* looks at the issue of brain-making from the perspective of attention, and deals with some of the same issues in a more popularized form, with engaging anecdotes and personal narratives about the importance of attention woven into discussions of research. Unlike Hayles, Davidson's concerns are explicitly pedagogical. Framing her argument around the issue of attention blindness, she urges readers to pay attention to brains and digital technologies differently. Like Hayles, she points to the plasticity of the brain, but her goal is threefold: to reassure adults that children will not be damaged by digital technolo-gies because that fear is based on "an old idea of neural development as fixed or 'hardwired'" (56); to urge the value of building "cognitive reserves" (269); and to claim that learning, especially using the Internet, should con-tinue throughout life, since "We're never too old to learn" (276). Davidson defines cognitive reserves as neural pathways developed by learning, which can take over some functioning if part of the brain is damaged. Drawing

on her own experiences as a student, her own teaching and visits to the classrooms of others, she argues for making teaching more interactive, for positioning the Internet centrally, for fostering collaboration among those who hold different views, and for requiring students to write online to get a more compelling sense of audience.

Davidson lambastes the current emphasis on standardized tests for emphasizing lower-order thinking, and she discusses alternatives like crowd-sourcing grades, badges, ePortfolios, adaptable challenge tests, and, especially, games. Turning to the workplace, Davidson claims that "if we understand more about how we have been encouraged to pay attention for the last hundred years and how we need to pay attention now, we can begin to rethink work in the future" (170) and argues again for collaboration based on difference. Davidson doesn't deal with all dimensions of attention but she underscores its importance. Filled with bracing admonitions, this book serves as a reminder that interest in neurological research and the implications of digital technologies extends well beyond the walls of the academy.

Indeed, there are a number of books—all addressed to broad audiences—about the brain and its relation to digital technologies. Like Davidson, Howard Rheingold urges the importance of attention and offers suggestions for managing it. Clay Shirky reminds us of the cognitive surplus available to our society if people watch less television and participate in online projects to solve problems and collaborate on civic projects. Both Mark Bauerlein and Nicholas Carr call upon brain plasticity to lament the effects of digital technologies on the brain, claiming that young people's learning and capacity to read deeply are being diminished. Maggie Jackson and Winifred Gallagher take a similarly negative view, claiming that digital technologies undercut our ability to focus and be aware of our world. Dean Buonomano describes how the brain's associative memory function makes humans vulnerable to the persuasions of advertisers and unable to connect events separated by time.

Most of the books published by the popular press frame the relationship between brain plasticity and digital technologies in negative terms, and together they can serve as a caution against seeing digital technologies as *the* solution to any number of teaching and learning challenges. Taking a longer view, however, makes their alarms seem less pressing. Compositionists were once preoccupied by cognitive processes and individual development, convinced that research in these areas could transform writing instruction. But intellectual winds soon blew in other directions, and socially-oriented perspectives on writing became more prominent under the influence of

theorists like Lev Vygotsky, Mikhail Bakhtin, and Kenneth Burke, leading to investigations of collaboration, social context, and power dynamics.

Still, the fact that both the popular press and scholarly monographs are looking at current neuroscience in relation to digital technologies suggests that this is an important topic both within and beyond the academy. Overall, there is reason to be optimistic: research on brain plasticity demonstrates that our students have significant capacities to learn and develop as writers particularly if we can help them manage attention and use digital technologies effectively.

At the same time, however, we need to remain cautious about *how* we take up new understandings of the brain. As Catherine Malabou observes in *What Should We Do with Our Brain?,* the shift from conceiving of the brain as an entity of (hard) wiring as opposed to plasticity represents more than an intellectual shift. . It can be conceptualized as part of the current economic and social environment's model of multiple connected but atomistic and mobile centers (think international corporations). Plasticity is sometimes erroneously equated with flexibility, but it is important to maintain a distinction between the two because flexibility connotes acquiescence and adaptation while plasticity—in its developmental, modulational, and reparative manifestations—refers to transformative ability. In Malabou's view we need to become more self-conscious about our own roles in "making" our brains, and in recognizing their transformative capacities. Sounds like an agenda for WPAs.

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