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## Translating Media: Why We Should Rethink Textuality

In “The Don Quixote of Pierre Menard,” Borges uses his technique of reviewing non-existent books to explain Pierre Menard’s fantastic project of re-creating *Don Quixote* in the twentieth century.<sup>1</sup> Although Menard’s creation reproduces Cervantes’ masterpiece word for word, Borges explains it is an utterly different work, for the changed cultural context makes thoughts that were banal for Cervantes virtually unthinkable for a twentieth-century intellectual. Borges’s mock-serious fantasy recalls more mundane operations carried out every day around the globe. Suppose *Don Quixote* is transported not into a new time but a new medium. The word sequences on the computer screen are identical to Cervantes’s original print edition; is this electronic version the same work? Subversive as Borges’s fiction, the question threatens to expose major fault lines running through our contemporary ideas of textuality.

To explore these complexities, I propose regarding the transformation of a print document into an electronic text as a form of translation, which is inevitably also an act of interpretation. In invoking the trope of translation I follow the lead of Dene Grigar. As she observes, the adage that something is gained as well as lost in translation applies with special force to importing print documents to the Web.<sup>2</sup> The challenge is to specify, rigorously and precisely, what these gains and losses entail and especially what they reveal about presuppositions underlying reading and writing. My claim is that they show our notions of textuality are shot through with assumptions specific to print, although they have not been generally recognized as such. The advent of electronic textuality presents us with an unparalleled opportunity to re-formulate fundamental ideas about texts and, in the process, to see print as well as electronic texts with fresh eyes. For theory, this is the “something gained” that media translation can offer. It is a gift we cannot afford to refuse.

The issues at stake can be illustrated by *The William Blake Archive*, a magnificent Web site designed by three of our most distinguished Blake scholars and editors.<sup>3</sup> It is no exaggeration to say that *The William Blake Archive* establishes the gold standard for literary Web

sites. The site is informed throughout by an enlightened editorial policy, for the editors state that they take the “work” to be the book considered as a unique physical object. They thus implicitly declare their allegiance to an idea that Jerome McGann, among others, has been championing: that the physical characteristics of a text—page size, font, gutters, leading, kerning and so on—are “bibliographic codes,” signifying components that should be considered along with linguistic codes.<sup>4</sup> The editors make canny use of the computer’s awesome simulation powers to render the screen display as much like the printed book as possible. They provide a calibration applet that lets users set screen resolution so the original page dimensions can be reproduced. They include a graphical help section that uses illustrations of pages to indicate the site’s functionalities and capabilities. Clearly an enormous amount of thought, time, and money has gone into the construction of this site.

The editors of the *Blake Archive* are meticulous in insisting that even small differences in materiality potentially affect meaning, so they have gone to a great deal of trouble to compile not only different works but extant copies of the same work. Yet these copies are visually rendered on screen using a technology that differs far more in its materiality from print than the print copies do from one another. The computer is able to simulate print documents accurately precisely because it is completely unlike print in its architecture and functioning. The simulation of visual accuracy, which has rendered an invaluable service in rescuing Blake from text-only editions that suppressed the crucial visual dimensions of his work, is nevertheless achieved at the cost of cybernetic difference. Consider for example the navigation functionalities, which allow the user to juxtapose many images on screen to compare different copies and versions of a work. To achieve a comparable (though not identical) effect with print—if it could be done at all—would require access to rare books rooms, a great deal of page turning, and the constant shifting of physical artifacts. A moment’s thought suffices to show that changing the navigational apparatus of a work changes the work. Translating the words on a scroll into a codex book, for example, radically alters how a reader encounters the work; by changing *how* the work means, such a move alters *what* it means. One of the insights electronic textuality makes inescapably clear is that navigational functionalities are not merely ways to access the work but part of a work’s signifying structure. An encyclopedia signifies differently from a realistic novel in part because its navigational functionalities anticipate and structure different reading patterns from the novel (a clash of conventions that Milorad Pavić has great fun in exploiting in *Dictionary of the Khazars: A Lexicon Novel*).

In terms of the *Blake Archive*, we might reasonably ask: if slight color variations affect meaning, how much more does the reader’s naviga-

tion of the complex functionalities of this site affect what the texts signify? Of course the editors recognize that what they are doing is simulating, not reproducing, print texts. One can imagine the countless editorial meetings they must have attended to create the site's sophisticated design and functionalities; surely they know better than anyone the extensive differences between the print and electronic Blake. Nevertheless, they make the rhetorical choice to downplay these differences. For example, there is a section explaining that dynamic data arrays are used to generate the screen displays but little or no theoretical exploration of what it means to read an electronic text produced in this fashion rather than the print original. Great attention is paid to the relation of meaning to linguistic and bibliographic codes and almost none to the relation of meaning to digital codes. Matthew Kirschenbaum's call for a thorough rethinking of "the materiality of first generation objects" in electronic media is very much to the point.<sup>5</sup> Concentrating only on how the material differences of *print* texts affect meaning is like feeling slight texture differences on an elephant's tail while ignoring the ways in which the tail differs from the rest of the elephant.

Tackling the whole elephant requires rethinking the nature of textuality, starting with a basic question: what is a text? Anna Gunder, in an effort to clarify the relations between electronic and print media, begins with a meticulous survey of textual criticism to determine how editors employ the foundational terminology of work, text, and document.<sup>6</sup> A "work" is an "abstract artistic entity," the ideal construction toward which textual editors move by collating different editions and copies to arrive at their best guess for what the artistic creation should be.<sup>7</sup> It is important to note that the work is ideal not in a Platonic sense, however, for it is understood to be the result of editorial assumptions that are subject to negotiation, challenge, community norms, and cultural presuppositions. (McGann's attacks on the principle of defining the work through an author's "final intentions" is a case in point). Next down the scale comes the text. Gunder points out that the "work as such can never be accessed but through some kind of text, that is, through the specific sign system designated to manifest a particular work."<sup>8</sup> Texts, then, are abstract entities from which editors strive to excavate the work. In this respect, she notes, texts of poems are unlike paintings. Whereas no one would claim it makes sense to talk about a painting separate from the substrate in which it is embodied, editors presume that it does make sense to talk about a text as something separate from its physical embodiment in an artifact. Only when we arrive at the lowest level of the textual hierarchy, the document, is the physical artifact seen as merging with the sign system as an abstract representation.

Gunder's analysis is consistent with the terminological practices of

Peter Shillingsburg, one of the editors she surveys. In *Scholarly Editing in the Computer Age: Theory and Practice*, Shillingsburg defines a text as “the actual order of words and punctuation as contained in any one physical form, such as a manuscript, proof or book.” To forestall misunderstanding, he clarifies that “a text (the *order* of words and punctuation) has no substantial or material existence, since it is not restricted by time and space . . . the text is contained and stabilized by the physical form but is not the physical form itself.”<sup>9</sup> Driving the nail further into this terminological coffin, he insists “it is possible for the same text to be stored in a set of alphabetic signs, a set of Braille signs, a set of electronic signals on a computer tape, and a set of magnetic impulses on a tape recorder. Therefore, it is not accurate to say that the text and the signs or storage medium are the same. If the text is stored accurately on a second storage medium, *the text remains the same though the signs for it are different*. Each accurate copy contains the same text; inaccurate or otherwise variant copies contain new texts.”<sup>10</sup> Although he admits, some hundred pages later, that “Proponents of the bibliographic orientation have demonstrated beyond argument, I believe, that the appearance of books signifies a range of important meanings to their users,” he apparently does not think this imbrication of physical form with meaning requires a different notion of textuality.<sup>11</sup> To be fair to Shillingsburg, he has since formulated the text as a compound of matter, concept, and action.<sup>12</sup> Nevertheless, there are no doubt many editors and literary scholars—I dare say the majority—who assume much the same definitions of work, text, and document that he formulates. Moreover, Shillingsburg’s more nuanced explanations of text and work in his recent analysis result in an alarming proliferation of terms, so that Work, Text, and Version all split into multiple sub-categories. This scheme is reminiscent of the Ptolemaic model of the universe as it piled epicycles upon cycles in an effort to keep the earth at the center of the universe. The problem with the Ptolemaic universe was not that it could not account for celestial motion but rather the cost of increasing complexity required for its earth-centric view. Perhaps it is time for a Copernican revolution in our thinking about textuality, a revolution achieved by going back and rethinking fundamental assumptions.

We can begin this assessment by noticing how perfectly crafted Shillingsburg’s definitions are to trivialize differences between print and electronic media and to insulate “text” and even more so “work” from being significantly affected by the specificities of media. To return to his examples, he claims that a Braille version of a novel is the same text as a print version, yet the sensory input of the two forms is entirely different. Moreover, it is clear that one medium—print—provides the base line for the definitions, even though they are postulated as including other media as well. Thinking of text as “the *order* of

words and punctuations” is as print-centric a definition as I can imagine, for it comes straight out of the printer’s shop and the lineation of type as the means of production for the book. We can see how Shillingsburg imports this print-centric notion into electronic media when he refers to “computer tape” in the quotation above, for this construction unconsciously carries over the notion that the text resides at one physical location, even though it is at the same time alleged to be “not restricted by time and space.” When a text is generated in an electronic environment, the data files may reside on a server hundreds of miles distant from the user’s local computer. Moreover, the text as “the actual order of words and punctuation” does not exist as such in these data files in cases where text is dynamically assembled on the fly. Indeed, it does not exist as an artifact at all. Rather, it comes into existence as a *process* that includes the data files, the programs that call these files, and the hardware on which the programs run, as well as the optical fibers, connections, switching algorithms and other devices necessary to route it from one networked computer to another.

An even more serious objection to Shillingsburg’s definition is its implicit assumption that “text” does not include such qualities as color, font size and shape, and page placement, not to mention such electronic-specific effects as animation, mouseovers, instantaneous linking, etc. In most contemporary electronic literature, screen design, graphics, multiple layers, color, animation, etc. are signifying components essential to the work’s effects. Focusing only on “the actual order of words and punctuation” would be as inadequate as insisting that painting consists only of shapes and ruling out of bounds color, texture, composition, perspective, etc. The largely unexamined assumption here is that ideas about textuality forged in a print environment can be carried over wholesale to the screen without rethinking how things change with electronic text, as if “text” were an inert, non-reactive substance that can be poured from container to container without affecting its essential nature.

Moreover, the comparison with electronic text reveals by implication how limited this definition of “text” is even for print media. Although Shillingsburg gives a nod to those of the “bibliographic orientation,” he does not begin to deal in a serious way with McGann’s brilliant readings of poets ranging from Lord Byron to Wallace Stevens and his repeated demonstrations that bibliographic effects are crucial in setting up meaning play within the texts. To exclude these effects from the meaning of “text” is to impoverish criticism by cutting it off from resources used to create artistic works. How can one find these effects in a text if “text” has been defined so as to exclude them? Although the definition of “work” may not be Platonic in an ideal sense, there is nevertheless a Platonic yearning on display in Shillingsburg’s

definitions, for he seeks to protect the “work” from the noisiness of an embodied world—but this very noise may be the froth from which artistic effects emerge.

The desire to suppress unruliness and multiplicity in search of an ideal “work” is deeply embedded in textual criticism. However the criteria facilitating this convergence are defined, textual editors have largely agreed that convergence is the ideal. Hans Zeller, arguing in 1975 for a shift of the editorial perspective from the author’s “final intentions” to a broader historical viewpoint, observes that “the editor searches in the transmitted text for the one authentic text, in comparison with which all else will be a textual corruption.”<sup>13</sup> Not arriving at a single authoritative text, editors argue, risks stranding the reader with a rat’s nest of complexly interrelated variants, thus foisting onto her the Sisyphean labor of sorting through the mess and arriving at a sensible reading text that most readers would prefer to have handed to them. Readers in this view want a text they can take more or less at face value so they can get on with the work of interpreting its meaning and explicating its artistic strategies. Here the comparison of editing with translation is especially apt, for the editor, like the translator, makes innumerable decisions that can never be fully covered by an explicit statement of principles. As McGann points out, these decisions inevitably function as interpretations, for they literally construct the text in ways that foreground some interpretive possibilities and suppress others.

When texts are translated into electronic environments, the attempt to define a work as an immaterial verbal construct, already problematic for print, opens a Pandora’s box of additional complexities and contradictions. These can be illustrated by debates within the community formulating the Text Encoding Initiative (TEI). The idea of TEI was to arrive at principles for coding print documents into electronic form that would preserve their essential features and moreover allow them to appear more or less the same in complex networked environments, regardless of platform, browser, etc. To this end the community (or rather, an influential contingent) arrived at the well-known principle of OHCO, the idea that a text can be encoded as an ordered hierarchy of content objects. As Allen Renear points out in his seminal analysis of this process, the importation of print into digital media requires implicit decisions about what a text is.<sup>14</sup> Expanding on this point, Mats Dahlström, following Michael Sperberg-McGueen, observes that the markup of a text is “a theory of this text, and a general markup language is a *general theory* or conception of text.”<sup>15</sup>

Renear identifies three distinct positions within the text encoding community with respect to the general theory of OHCO, which corresponds roughly to three historical stages. The first stage held that a

text consists of a hierarchical set of content objects such as chapters, sections, subsections, paragraphs, and sentences. This view asserted that the hierarchy is essential to the production of the text as text and so must occupy center stage in transforming print text into digital code. The belief informed how the community used SGML, Standard Generalized Markup Language, to create protocols and standards that would ensure the content objects are reproduced in digital media, and moreover reproduced in the same hierarchy as print.<sup>16</sup> Although most of these researchers thought of themselves as practitioners rather than theorists, as Renear points out, their decisions constituted a *de facto* theory of textuality reinforced by their tacit assumption that the “Platonic reality” of a text really is its existence as an ordered hierarchy of content objects.

The next phase, which Renear identifies as pluralism, was propelled by the realization that many texts consist of not just one hierarchy but several interpenetrating hierarchies; the standard example is a verse drama, which can be parsed as sentences and metrical lines. This led epistemologically to a view of texts as *systems* of ordered hierarchies, and refinements such as Document Type Definitions (DTDs) were designed to introduce more flexibility into the system. The third stage, which Renear calls antirealism, drew the conclusion that the text does not pre-exist encoding as a stable ontological object but rather is brought into existence through implicit assumptions actualized through encoding procedures. Renear quotes Alois Pichler as exemplifying this approach:

Our aim in transcription is not to represent as accurately as possible the originals, but rather to prepare from the original another text so as to serve as accurately as possible certain interests in the text.<sup>17</sup>

Renear, who self-identifies as a pluralist, astutely points out the tautologies and ambiguities in the antirealist position, for example the indeterminacies in identifying which “certain interests in the text” are to be served.

My interest in this controversy points in a different direction, for what strikes me is the extent to which all three positions—Platonist, pluralist, and antirealist—focus almost exclusively on linguistic codes, and how this focus allows them to leave the document as a physical artifact out of consideration. I can illustrate the implications of this erasure by returning to *The William Blake Archive*, which as we have seen does consider the book as a physical object. The editors’ encoding practices, however, make clear that they implicitly understand the bibliographic almost exclusively in terms of the visual. Other aspects of the text as physical object, such as the lovely feeling of a leather binding or the musty smell of old paper, are not reproduced in digital codes. To undertake the *complete* bibliographic coding of a book into

digital media would be to imagine the digital equivalent of Borges's Library of Babel, for it would have to include an unimaginable number of codes accounting for the staggering multiplicity of ways in which we process books as sensory phenomena. To reduce this impossible endeavor to manageable proportions, editors must of course identify some features of particular interest, and it makes excellent sense to emphasize the visual aspect of Blake's works. But we lose important insights if we naturalize this process and allow ourselves the illusion that Blake's books—or any books for that matter—have been faithfully reproduced within digital media. Rather, *choices* have been made about which aspects of the book to encode, and these choices are heavily weighted toward the linguistic rather than the bibliographic. Moreover, the choices have further implications in the correlations they establish between linguistic, bibliographic, and digital codes. As Dino Buzzetti shows in his rigorous analysis of how markup languages such as SGML relate to the Hjelmslevian distinction between content and expression (the physical instantiation of a text), markup languages do not solve the problems raised by thinking of the text as an abstract entity but rather amplify implicit problems and further complicate the situation.<sup>18</sup> Only if we attend to the interrelations of linguistic, bibliographic, and digital codes can we grasp the full implications of the transformations books undergo when they are translated into a digital medium.

The debates about encoding implicitly assume (with the exception of the antirealist position) that there is some textual essence that can be transported from print to digital media. Even the antirealist position assumes an essence, although now it is an essence created by an editor. All three positions elide the materiality of books and their physical differences from electronic texts. A more accurate perception would focus on the editorial process of choice, which is always contextual and driven by "certain interests," although these reside not exclusively in the text but in the conjunction of text, editorial process, and cultural context. In my view, the ontology card is not worth playing. There is no Platonic reality of texts. There are only physical objects such as books and computers, foci of attention, and codes that entrain attention and organize material operations. Since no print books can be completely encoded into digital media, we should think about correspondences rather than ontologies, entraining processes rather than isolated objects, and codes moving in coordinated fashion across representational media rather than mapping one object onto another.

The issue goes to the heart of what we think a text is, and at the heart of the heart is the belief that work and text are immaterial constructions independent of the substrates in which they are instantiated. We urgently need to rethink this assumption, for as long as it remains



intact, efforts to account for the specificities of print and electronic media will be hamstrung. Without nuanced analyses of the differences and similarities of print and electronic media, we will fail to grasp the fuller significance of the momentous changes underway as the Age of Print draws to a close and print—as robust, versatile, and complex as ever—takes its place in the dynamic media ecology of the twenty-first century. For this we will require a more workable sense of materiality than has traditionally been the case with theories of textuality that invoke it only to dismiss it as something to be left behind through the labor of creating the ideal work.

There are, of course, good reasons why editors have sought to separate the idea of the work from its physical instantiation. If the “work” is imbricated in its physical form, then every edition would produce, by definition, another “work,” and textual form would never be able to be stabilized. Whether textual form should be stabilized is a question at the center of McGann’s “experiments in failure” that he discusses in *Radiant Textuality: Literature after the World Wide Web*. As both Dahlström and McGann point out, the two imperatives guiding most textual criticism are, if not contradictory, at least in tension with one another: editors want to converge on the ideal work and at the same time provide readers as much information as possible about textual variants.<sup>19</sup> The Web promises to allow these dual imperatives to be more successfully integrated than ever before, as *The William Blake Archive* and McGann’s work on *The D. G. Rossetti Hypermedia Archive* demonstrate. At the same time the Web, through its remarkable flexibility and radically different instantiation of textuality, also draws into question whether it is possible or desirable to converge on an ideal “work” at all. Educated by his work with *The Rossetti Archive*, McGann argues against convergence as a critical and theoretical principle, attempting to show through cogent readings of poetic works and other strategies that a text is never self-identical with itself (he means this term in a rather different way than it appears in deconstructive criticism, which he dismisses too lightly in a few condescending sentences).

Instead he argues for the practice of what he calls “deformation,” a mode of reading that seeks to liberate from the text the strategies by which it goes in search of meaning. Following the ideas of Galvano della Volpa, an Italian critic writing in the 1960s, he argues that meaning is not the goal of critical explication but a residue left over after critical interrogation is finished. Meaning itself cannot be the goal of critical explication, for “this would run the risk of suggesting that interpretation can be adequate to poiesis. It cannot.”<sup>20</sup> Indeed, explication cannot even be adequate to its own understanding of itself, which can be accomplished only through an explication of the explication, which in turn requires another explication to try to get at the residue left over when these two explications are compared, and so on to in-

finity or exhaustion of the critical will. Underlying this argument is an implicit analogy. Just as textual criticism has traditionally tried to converge on an ideal work, so hermeneutical criticism has tried to converge on an ideal meaning. Echoing deconstructive theory more than he acknowledges, he asks what would happen if both kinds of enterprise abandoned the movement toward convergence and tried instead to liberate the multiplicities of texts through disciplined series of deformations. Thus, he is more interested (at least theoretically) in what deformations of Rossetti's images in Photoshop reveal about their composition than in the accomplishments of *The William Blake Archive* in simulating the color tones and sizes of the paper documents.<sup>21</sup>

This kind of argument opens the way for a disciplined inquiry into the differences in materiality between print and electronic textuality. As editor of *The Rossetti Archive*, McGann has had ample—one might almost say, painful—opportunity to appreciate the differences between the print and electronic text. Indeed, it is precisely this gap that leads him to think John Unsworth's essay "The Importance of Failure" is so important.<sup>22</sup> His project is to convert the failure to make electronic textuality perform as an exact duplicate of print into a strength by using "deformation" as a tool for critical insight. He emphasizes the importance of *doing* and *making*, suggesting that practical experience in electronic textuality is a crucial prerequisite for theorizing about it. In this sense his work represents an important advance over the rhetoric of *The William Blake Archive* (though not necessarily over its technical accomplishments), for he sees that electronic textuality can be used as something other than a simulacrum of print. Rather, he understands that it can provide a standpoint from which to rethink the resources of the print medium.

The impact of his experience is readily apparent in his re-descriptions of print texts in terms that make them appear fully comparable to electronic texts. He argues, for example, that all texts are marked; paragraph indentations and punctuation he regards as forms of marking equivalent to HTML, the Hypertext Markup Language used to format documents for electronic environments. Moreover, he proposes that all texts are algorithmic, containing within themselves instructions to generate themselves as displays (the display form of the document here being considered distinct from the data and algorithms used to create it). So extensive and detailed are his redescriptions that one wonders if electronic text has any distinctive features of its own. The burden of his argument would suggest that it does not, an implication strengthened by his over-causal dismissal of the cases made by Janet Murray and Espen Aarseth for the specificities of electronic textuality.

When push comes to pixel, it is clear that McGann's primary allegiance is to print rather than electronic textuality. He repeatedly asserts that the resources of the electronic medium pale in comparison

to print. Speaking specifically of fiction, he argues “there is no comparison . . . between the complexity and richness of paper-based fictional works, on the one hand, and their digital counterparts—hypermedia fiction—on the other.”<sup>23</sup> Although he is too astute a critic to make comparisons directly, by juxtaposing in the next sentence Stuart Moulthrop with Italo Calvino, he implies that Moulthrop, a contemporary pioneer in electronic hypertext, is not as good a writer as Calvino, or at any rate does not produce literature as good. Like many arguments McGann mounts to prove the superiority of print, the implied comparison here between print and electronic literature is seriously flawed. It is obviously inappropriate to compare a literary medium that has been in existence for fifteen years with print forms that have developed over half a millennium. A fairer comparison would be print literature produced between 1550–1565, when the conventions of print literature were still in their nascent stages, with the electronic literature produced between 1985–2000. I believe that anyone familiar with both canons would be forced to agree it is by no means obvious that the print canon demonstrates conclusively the superiority of print as a medium for literary creation and expression. Given five hundred years in which to develop—if we can possibly stretch our imaginations this far—electronic literature may indeed prove itself the equal or superior to print.

If, as Mrs. Malaprop observes, comparisons are odious, this one is especially so. As McGann acknowledges, it should not be a question of pitting one medium against the other but rather of understanding the specificities of each. McGann opens the way for important insights into print by using electronic textuality to understand more fully and deeply its possibilities. Unfortunately, he is not as successful in using print to understand the specificities of electronic textuality. When problems crop up in his arguments, they almost always stem from this source. He asserts, for example, that print text differs from itself, and he uses close readings to argue the point. But this confuses what happens in the mind of the reader with the stability of print in a given document. To demonstrate that print is indeed unstable even at the level of a document, he performs experiments scanning a document with an optical character reader and reports that on different scans, the machine gives different readings. This does not demonstrate that print is not self-identical, however, only that the translation between print and electronic text is unstable. In other arguments he conflates the instability of a text—for example, variations in different copies of an edition or between different editions—with the instability of a print document, again to argue that print, like electronic text, is fluid and unstable. The stubborn fact remains, however, that once ink is impressed on paper, it remains relatively stable and immovable. The few exceptions that might be invoked—for example, an artist’s book cre-

ated with thermochromic ink that changes color when heated by a hand touch, or print impressed on cutouts that move—should not be allowed to obscure the general observation that the print of a given document is stable for (more or less) long periods of time, in dramatic contrast to the constant refreshing of a computer screen many times each second. Moreover, print does not normally move once impressed onto the paper fiber, again in contrast to the animations, rollover, etc. that increasingly characterize electronic literature. No print document can be reprogrammed once the ink has been impressed onto the paper, whereas electronic texts routinely can. These differences do not mean, of course, that print is inferior to electronic text, only that it is different. Admitting these differences does not diminish the complexity and flexibility of print books, which have resources different from those of electronic texts. But it does pave the way to understand the specificities of electronic textuality and thereby come to a fuller appreciation of its resources as well.

What then are these differences, and what are their implications for theories of textuality? Dahlström tackles this question in his exploration of how notions of a scholarly edition might change with electronic textuality.<sup>24</sup> He makes the important point, also noted by Anna Gunder, that with electronic texts there is a conceptual distinction—and often an actualized one—between storage and delivery vehicles, whereas with print the storage and delivery vehicles are one and the same. With electronic texts, the data files may be on one server and the machine creating the display may be in another location entirely. This means that electronic text exists as a distributed phenomenon. The dispersion introduces many possible sources of variation into the production of electronic text that do not exist in the same way with print, for example when a user's browser displays a text with different colors from those the writer saw on her machine when she was creating it. More fundamental is the fact that the text exists in dispersed fashion even when it is confined to a single machine. There are data files, programs that call and process the files, hardware functionalities that interpret or compile the programs, and so on. It takes all of these together to produce the electronic text. Omit any one of them, and the text literally cannot be produced. For this reason it would be more accurate to call an electronic text a *process* rather than an object. Certainly it cannot be identified with, say, a diskette or a CD-ROM, for these alone could never produce the text unless they are performed by the appropriate software running on the appropriate hardware.

Because this is a frequent point of confusion, let me emphasize that this processing is necessarily prior to whatever cognitive processing the user performs to read and interpret the text. Although print readers perform sophisticated cognitive operations when they read a book, the printed lines exist as such before the book is opened, read, or un-

derstood. An electronic text does not have this kind of prior existence. It does not exist anywhere in the computer, or in the networked system, in the same form it acquires when displayed on screen. After it is displayed, of course, the same kind of readerly processing may occur as with print. But we should not indulge in the logical confusion created by eliding the creation of the display—a process that happens only when the programs that create the text are activated—with the reader's cognitive processing. In this sense electronic text is more processural than print; it is performative by its very nature, independent of whatever imaginations and processes the user brings to it, and regardless of variations between editions and copies.

Acknowledging these differences, Dahlström argues that electronic text should therefore be understood as consisting at bottom of binary code, the sequences of ones and zeros that underlie all the languages built on top of them. But defining electronic text in this way inexplicably privileges binary code over all the other aspects necessary to produce the text as a document a user can read, a move reminiscent of Friedrich Kittler's argument in "There Is No Software."<sup>25</sup> In further insisting that electronic text is above all a pattern, Dahlström risks reinscribing the dematerialization so prominently on display in Shillingsburg's definition of text as a sequence of words and pauses. If the idea of *print* text as a dematerialized entity is already a fiction (however convenient), how much more fictional is the idea of an electronic text as binary code, when how that code is stored, processed, and displayed is utterly dependent on the nature of the hardware and software? Perhaps it is time to think the unthinkable—to posit a notion of text that is not dematerialized and that does depend on the substrate in which it is instantiated. Rather than stretch the fiction of dematerialization thinner and thinner, why not explore the possibilities of texts that thrive on the entwining of physicality with informational structure?

This is where I think McGann is trying to go with his argument that texts are never self-identical, an insight he is developing further in his present work on the quantum nature of textuality (i.e., textuality that is unresolvably ambiguous until a reader interacts with it in a specific way). As we have seen, if one accepts the materiality of the text, the move opens the door to an array of infinite difference, with no text identical to any others because there are always differences between any two physical objects, however minute. Although McGann's strong commitment to print apparently prevents him from thinking through the full implications of this assertion with regard to electronic texts, the argument that a text is not physically self-identical—however strained with print—is mere common sense with electronic texts. Consider, for example, the time it takes images to appear on screen when they are being drawn from a remote server. Certainly the time

lag is an important component of the electronic text, for it determines in what order the user will view the material. Indeed, as anyone who has grown impatient with long load times knows, in many instances it determines whether the user will see the image at all. These times are difficult to predict precisely because they depend on the individual computer's processing speed, traffic on the Web, efficiency of data distribution on the hard drive, and other imponderables. This aspect of electronic textuality—along with many others—*cannot be separated from the delivery vehicles that produce it as a process with which the user can interact*. Moreover, for networked texts these vehicles are never the same twice, for they exist in momentary configurations as data packets are switched very quickly from one node to another, depending on the traffic at the instant of transfer. In this respect and many others, electronic texts are indeed not self-identical. As processes they exhibit sensitive dependence on temporal and spatial contexts, to say nothing of their absolute dependence on specific hardware and software configurations. Rita Raley points to this aspect of electronic textuality in her emphasis on performance.<sup>26</sup> Seeking to locate the differences between print and electronic texts, she remarks, “The operative difference of hypertext can only be revealed in the performing and tracing of itself, in its own instantiation.”<sup>27</sup>

What are the consequences of admitting an idea of textuality as instantiated rather than dematerialized, dispersed rather than unitary, processual rather than object-like, flickering rather than durably instantiated? The specter haunting textual criticism is the nightmare that one cannot then define a “text” at all, for every manifestation will qualify as a different text. Pervasive with electronic texts, the problem troubles notions of print texts as well, for as physical objects they would also differ from one another. But this need not be a catastrophe if we refine and revise our notion of materiality.

Let us begin rethinking materiality by noting that it is impossible to specify precisely what a book—or any other text—is as a physical object, for there are an infinite number of ways its physical characteristics can be described. Speaking of an electronic text, for example, we could focus on the polymers used to make the plastic case or the palladium used in the power cord. The physical instantiation of a text will in this sense always be indeterminate. What matters for understanding literature, however, is how the text creates possibilities to create or pursue meaning by mobilizing certain aspects of its physicality. These will necessarily be a small subset of all possible characteristics. For some texts, such as Edwin Schlossberg's artist's book *wordswordswords*, the activated physical characteristics may include the paper on which the words are impressed.<sup>28</sup> For other texts, the paper's contribution may be negligible.

The example suggests a way to think texts as embodied entities

without falling into the chaos of infinite difference. *The materiality of an embodied text is the interaction of its physical characteristics with its signifying strategies.*<sup>29</sup> Centered in the artifact, this notion of materiality extends beyond the individual object, for its physical characteristics are the result of the social, cultural, and technological processes that brought it into being. As D. F. McKenzie has argued in the context of the editorial theory of “social texts,” these too are part of its materiality, which leads to the conclusion that it is impossible to draw a firm distinction between bibliographic and interpretive concerns. “My own view is that no such border exists,” McKenzie comments.<sup>30</sup> Because materiality in this view is bound up with the text’s content, it cannot be specified in advance, as if it existed independent of content. Rather, it is an *emergent* property. What constitutes the materiality of a given text will always be a matter of interpretation and critical debate; what some readers sees as physical properties brought into play may not appear so to other readers. But this is not the end of the world as textual criticism has known it. Indeed, it is normal procedure for literary scholars to consider text as something negotiated among a community of readers, infinitely interpretable and debatable.

The specter of never being able to claim that different documents constitute the same text now appears much less threatening. Critical debate will explore whether there are sufficient differences in materiality (which in this definition cannot simply be collapsed into physicality) between two documents to warrant considering them different texts. If strong cases can be made for the interplay of physical differences with the two documents’ signifying strategies as understood and interpreted by readers, then perhaps they should be considered different texts. Common sense is not violated by supposing that a penny broadside bound in a handsome red cover and signed for with due ceremony from the Rare Book Room of the British Museum is a different text than the same broadside snatched from the gutter and quickly scanned in Shakespeare’s London. Indeed, it would strain credulity to suppose that the different physical instantiations of these two documents has no effect on how and what they signify (I speak here only of the physical differences, not the inevitable differences also introduced by culture, language, etc., though these too obviously play a role in how materiality will emerge). In this account of embodied textuality, texts would spread out along a spectrum of similarity and difference along which clusters would emerge. Texts that differed only slightly would occupy adjacent points (say, different editions that closely matched each other in physical characteristics), while outlying members of the cluster might include texts in different media (Braille rather than print, an electronic version of a print text, a film version of a novel, etc.).<sup>31</sup> These clusters can usefully be considered to constitute a “work,” without implying that “work” is a single convergent

object. Editors might argue, for example, that a given edition should be privileged because it is positioned at the center of a cluster, or they might discuss an edition in terms of some notion of a weighted average. In a sense, of course, this is already the case. What would change is not so much editorial practice as the conceptual framework and vocabulary invoked to explain and justify an edition.

Perhaps the most important consequence to emerge from this new framework is to prevent the text from being thinned out of existence as a physical object. Texts would routinely be discussed *both* in terms of their conceptual content and their physical embodiments. In some instances a text would remain relatively constant over many documents, assuming that debate agreed that the physical differences between the documents were not important as signifying components. In other instances, there could be as many texts as there are documents. Neither document, text, or work would be considered immaterial; all would be invested with nuanced senses of their materialities, a viewpoint that would further energize and foreground discussions of how physical characteristics, verbal content, and non-verbal signifying strategies work together to produce the object called "text."

These changed senses of work, text, and document make it possible to see phenomena that are now obscured or made invisible by the reigning ideologies. For example, with the advent of the Web, communication pathways are established through which texts cycle in dynamic interaction with one another. This leads to what might be called Work as Assemblage, a cluster of related texts that quote, comment upon, amplify, and remediate one another. One form of such an assemblage is illustrated by *Dark Lethe*, a science fiction site at which collaborators contribute stories loosely related to one another.<sup>32</sup> Another example suggested by David Silver is the cluster of texts associated with *Myst*, which includes, in addition to the computer game and its companion game *Riven*, Web sites populated by devotees of the games, as well as the associated print novels that expand upon the narratives in the games and supply backstories and other plot details missing from the games.<sup>33</sup>

Yet another example is the cluster of texts around *House of Leaves*, Mark Danielewski's brilliant contemporary print novel. *House of Leaves* was first published on the Web before being instantiated in print. The print novel itself exists in four different editions, each significantly different from the others. Also in the cluster is a Web site devoted to *House of Leaves*, on which hundreds of readers make postings exploring details of the print novels.<sup>34</sup> Other examples include the now-common practice of setting up Web sites to go along with the release of new films. Although many of these sites are merely publicity vehicles, a new genre is emerging in which the site is an independent aesthetic production initiating media-specific strategies to



transform, subvert, and play with the film's material. The fascinating site for *Requiem for a Dream* includes pseudo-advertisements, graphic mutations of scenes and characters from the film, and reinscriptions of scraps of dialogue recontextualized visually and verbally to interrogate their meanings, an Assemblage that Jack Post has compellingly argued constitutes a new art form.<sup>35</sup>

Going along with the idea of Work as Assemblage are changed constructions of subjectivity. The notion of the literary work as an ideal immaterial construction has been deeply influenced by a unitary view of the subject, particularly in the decades when editors sought to arrive at the work by determining an author's "final intentions." The work as it was formulated using this principle in turn reinforced a certain view of the author as a literary figure. The unitary work and the unified subject mutually reinforced and determined each other. As the rest of critical theory and cultural studies was deconstructing the unified subject and exposing the problematic ideological bases on which it rested, editorial criticism underwent similar revisionist movements, particularly in McGann's arguments for the "social text."<sup>36</sup> Perhaps now it is time to think about what kinds of textuality a dispersed, fragmented, and heterogeneous view of the subject might imply.

An appropriate model may present itself in Deleuze and Guattari's rhizomatic Body without Organs (BwO), a construction that in its constant de- and re-territorialization has no unified essence or identifiable center, only planes of consistency and lines of flight along which elements move according to the charged vectors of desire.<sup>37</sup> The examples given above of the Work as Assemblage (which by analogy can be abbreviated as the WaA) can be thought of as clusters, like all embodied literary works, but in these instances the clusters take the distinctive form of rhizomatic tendrils branching out from one another in patterns of fractal complexity. WaA in this view is not an aberration but a paradigmatic configuration that writes large the dynamics of remediation and media specificity at work in all embodied texts.<sup>38</sup> Rather than being bound into the strait jacket of a work possessing an immaterial essence that it is the goal of textual criticism to identify and stabilize, the WaA derives its energy from its ability to mutate and transform as it grows and shrinks, converges and disperses according to the desires of the loosely formed collectives that create it. Moving fluidly among and across media, its components take forms distinctive to the media in which they flourish, so the specificities of media are essential to understanding its morphing configurations.

To see such possibilities—to bring the Work as Assemblage into sight at all—requires a fundamentally different view of authorship than that which undergirds the idea of the work as an immaterial verbal construction. The subjectivity implied by the WaA cannot by any stretch of the imagination be considered unified. Rather, the subjects

producing it are multiple in many senses, both because they are collectivities in and among themselves, and also because they include non-human as well as human actors. With an electronic text, the computer is also a writer, and the software programs it runs to produce the text as process and display also have complex and multiple authorship (not to mention the authoring done by hardware engineers in configuring the logic gates that create the bit stream). A robust account of materiality focusing on the recursive loops between physicality and textuality is essential to understanding the dynamics of the WaA. Once we let go of the assumption that the literary work must be an expression of an immaterial essence—a line of thought dominant in literary criticism at least since the eighteenth century—we see the new forms of textuality that, galloping ahead of textual theory, are already cycling through diverse media in exuberant and playful performances that defy the old verities even as they give rise to the new.

The present moment presents us with a rare opportunity to break out of assumptions that have congealed around the technology of print, rendered transparent by centuries of continuing development, refinement, and use. This opportunity is powerfully present in the implicit juxtaposition of print and electronic textuality. The game is to understand both print and electronic textuality more deeply through their similarities and differences relative to one another. McGann's project of revitalizing our understanding of print by re-describing it in terms usually used for electronic text is a seminal contribution. The very comprehensiveness that makes his redescriptions so valuable, however, also works to obscure the differences between the two media. A nuanced understanding of the differences is as important to the project as a deep appreciation for the similarities, and it is these that I accordingly now want to highlight.

First is the fact that an electronic text is generated through multiple layers of code processed by an intelligent machine *before* a human reader decodes the information. McGann argues that print texts are also coded, but this point relies on slippage between the narrow sense of code as it applies to computers and a more general sense of code as Roland Barthes envisioned it, including codes of social decorum, fashion, polite conversation, etc.<sup>39</sup> In the narrow sense in which code operates in computers, code can be defined as a system of correspondences that relate the elements of one symbol set to another symbol set, for example when Morse code associates dots and dashes with alphabetic letters. Unlike Morse code, however, code within the computer is *active*, for it functions as instructions that initiate changes in the system's behavior.

Working with these instructions, writers develop a nuanced sense of code as a form of writing with its own stylistic elegances and formal

possibilities. Increasingly, writers of electronic literature view code as a resource for signifying practices. Reviewing some of this work, Loss Glazier, a distinguished writer of electronic poetry as well as a critic, observes that programming *is* writing (a point also made by John Cayley).<sup>40</sup> He argues that users who want to understand how an electronic text works cannot afford simply to stay at the surface level of the screenic text, any more than a writer can afford to know nothing about how screenic text is generated and displayed. Agreeing with McGann that the defining characteristic of literary language is the impulse to investigate its conditions of possibility, he names literary writing as “writing that, whether or not it serves other ends, has an engagement with its own formal qualities.”<sup>41</sup> He sees print and electronic text on a continuum, arguing that “innovative literature” in both media “has explored the conditions that determine . . . the procedure, processes, and crossed paths of meaning-making, meaning-making as constituting the ‘meaning.’”<sup>42</sup> As Glazier points out, print writers have also explored the materiality of the medium, from the typewriter poems of Ian Hamilton Finlay to the Mimeo movement and concrete poetry. The specificity of electronic media, he implies, lies in its distinctive materiality: “materiality is key to understanding innovative practice.”<sup>43</sup>

These useful insights are somewhat offset by Glazier’s tendency to elevate his preferred genre—poetry—and his preferred set of literary strategies at the expense of narrative and “non-innovative literature,” a back formation that certainly does not do justice to the complexity of other literary strategies. While he has a remarkable sense of the possibilities for electronic poetry, his remarks on “non-innovative literature” are flat to the point of unintentional parody. “Non-innovative literature,” he writes, “can be said to possess a number of distinguishing textual features. These can include narrative, plot, anecdotal retelling of human experiences, logical descriptions, chronological sequence of events, a reliance on factual information, a view of language as a transparent (at most, tinted) bearer of meaning, and an attachment to a Modernist aesthetic.”<sup>44</sup> The underlying culprit in his view is “the position of the ‘I,’” which non-innovative literature constructs by asserting “forms of authority” and creating “a nonpermeable (or semi-permeable) filter between the ego and the world.”<sup>45</sup> Although Glazier tends to identify these qualities with narrative, which apparently for him is virtually synonymous with bad literature, I suspect that non-innovative literature as he characterizes it is an empty set. Does there exist any important Modernist text for which a convincing critical argument could not be made that it destabilizes language, subjectivity, and consciousness? As Johanna Drucker dryly comments in her review of Glazier’s book, “The traditions of innovation from which

Glazier draws for support are often broader in their scope and of much more complex development than his taking up them within late twentieth century references would imply.”<sup>46</sup>

Returning to the specificity of electronic text, let us delve more deeply into how the performative power of networked and programmable media enables them to simulate print texts so successfully. Central to this success is what Rita Raley calls the “tower of machine languages,” a point John Cayley explicates when he refers to “machine code, tokenized code, low-level languages, high-level languages, scripting languages, macro languages, markup languages, Operating Systems and their scripting language” and so on, all stacked in different levels.<sup>47</sup> Raley’s phrase alludes, of course, to the Tower of Babel, a mythic origin story that was also important to Warren Weaver’s seminal Memorandum of July 15, 1949, subsequently published as an essay.<sup>48</sup> Alluding to his essay, Weaver in “Foreword: The New Tower” suggested machine translation should be seen as a “Tower of Anti-Babel,” since in his optimistic expectation it promised to allow “men to communicate freely” despite differences in language.<sup>49</sup> In the essay he relates an incident in World War II in which a cryptographer was able successfully to decrypt a message in Turkish, although he did not know the source text was written in Turkish and also did not himself read Turkish. Weaver recounts sending a letter to Norbert Wiener in which he suggested machine translation should be treated as a problem in cryptography. “It is very tempting to say that a book written in Chinese is simply a book written in English which was coded into the ‘Chinese code.’ If we have useful methods for solving almost any cryptographic problem, may it not be that with proper interpretation we already have useful methods for translation?”<sup>50</sup> Raley rightly criticizes the hegemonic implication here that all languages are in some sense already English.<sup>51</sup> Additionally, there is a fallacy, as W. J. Hutchins points out in his critique of the Memorandum, which lies “in a confusion between the activities of decipherment and translation,” along with a resulting erasure of the historical and cultural specificities of natural languages.<sup>52</sup>

In another passage from the Memorandum, Weaver comes closer to contemporary understandings of networked and programmable media. “Think, by analogy, of individuals living in a series of tall closed towers, all erected over a common foundation. When they try to communicate with one another, they shout back and forth, each from his own closed tower. It is difficult to make the sound penetrate even the nearest towers, and communication proceeds very poorly indeed. But, when an individual goes down his tower, he finds himself in a great open basement, common to all towers. Here he establishes easy and useful communication with the persons who have also descended from their towers.”<sup>53</sup> In context, Weaver believed the “great open

basement” would be a universal substratum common to all languages. His hope finds a very different instantiation in the transcoding of many different kinds of documents—not only words but also sounds, images, films, etc.—in the binary code that operates in the “basement” of the Tower of Languages.<sup>54</sup>

A code capable of transcoding every input, however diverse, speaks to the realization of a universal solvent that can dissolve all texts into itself. The complementary process is re-constituting difference through the multiple re-encodings necessary to transform print documents into electronic texts. While print characters can be unambiguously associated with strings of machine code, the reconstitution process frequently results in multiple and profound ambiguities when it tries to translate the bibliographic codes of the print original. One can go down into the basement without getting lost but going back up is a different matter, for the layout is such that one never resurfaces in the same tower (i.e., a print document) from which one descended.

If this resurfacing enacts the Italian adage “traduttore traditore” (a translator is a traitor to the original), it also fulfills the promise of gaining something through translation. Here we may profitably refer to the brilliant work Efrain Kristal has recently done on Borges’s idea of translation.<sup>55</sup> Kristal compellingly shows that Borges thought of all writing as translation, not in the strong sense Octavio Paz employs of writing as a translation of experience, but rather in the sense of all writing as a stab in the dark at articulating meanings that always remain to some extent elusive.<sup>56</sup> Rather than hoping for an ur-language that would provide the key to universal translation, Borges delighted in thinking of all writing as drafts in progress, imperfect instantiations never fully up to the task. Texts are in this view provocations to go in search of meaning (echoing McGann); when they become instantiated in a given set of words (and we may add, a given medium and performance in that medium), they necessarily miss some possibilities even as they realize others. Hence for Borges it is entirely possible for an “original” text to be unfaithful to its translation (in the sense of being inferior to its successor), for the translation may realize more fully possibilities only nascent in the “original.” Indeed this view draws into question the very idea of an “original,” for temporal priority does not signify ontological priority when the original is regarded as simply one draft among many. Kristal comments that “Depending on the specific case, [Borges] at times favored a translation over its original, other times an original over its translation, and he was often interested in weighing their relative merits, aesthetic and otherwise.”<sup>57</sup>

Thinking of texts as provocations to go in search of meaning fits well with the idea of Work as Assemblage, for like the restless workings of desire and “lines of flight” that trace territorializations and de-

territorializations of the Body without Organs, texts in an Assemblage become translations without necessarily granting any one the status of the “original.” Everything is simultaneously a translation of everything else, each united to the others in a rhizomatic network without a clear beginning or end. That Borges arrived at this view while working exclusively in print should caution us not to overstate the fluidity of electronic texts compared to print. There is a long history of using the resources of print to achieve fluidity and indeterminacy, as Johanna Drucker among others has powerfully argued in her critical writing and demonstrated in her creative work. It remains the case, however, that the resources of print are *different* from the resources of electronic textuality.

To explore these differences, I turn now to John Cayley’s *riverIsland*, an embodied electronic work that performs as well as instantiates connections between media and linguistic translation. Central to this work and other pieces by Cayley is his idea of “transliteration,” a hybrid term that he parses as containing the concepts of translation (transl[iter]ation), iteration ([transl]iteration), and the literal ([trans]literation[ion]). A Sinologist and translator of Chinese poetry as well as a distinguished poet and artist in his own right, Cayley sees linguistic translation as a procedural iteration that moves recursively and provisionally between linguistic equivalents in different languages, tentatively making choices that are continuously revised and reworked as the translation proceeds. Perhaps because he is translating between the radically different symbol sets of Chinese characters and alphabetic letters, he is keenly aware that translation is not about capturing a textual essence, a transcendental signifier, but rather about fashioning a more or less satisfactory equivalent that seeks to create similar effects to the original through very different means. His method implies a strong similarity between media and linguistic translation. Just as *The William Blake Archive* achieves visual similitude precisely because its technology is completely different from print, so a translation from Chinese into Anglo-European language seeks to create similitude through the different linguistic technology of alphabetic letters.

These effects are beautifully on display in *riverIsland*. The work is conceptualized as consisting of two loops of poems, one horizontal and one vertical. The horizontal loop contains sixteen quatrains (out of the original twenty) of Wang Wei’s famous “Wang River Sequence,” written in the eighth century and translated from the Chinese into English by Cayley. The poems display as letters on the screen and the sound of the poems being read. At the bottom of the screen is a QuickTime movie of flowing water.<sup>58</sup> The user can navigate the loop either by grabbing the movie and moving it to the right or left, or by using the navigational icon. As the user leaves one node to travel to the next, the sound of the first poem overlaps with the sound of the

second as the letters of the first text morph into the letters of the second. When the second node is reached, the sound of the first fades and the sound of the second becomes dominant, at the same time as the letters stabilize into new words.

The vertical loop runs “upward” from the base of the first poem in the horizontal loop. This loop contains sixteen different translations of the same poem, including different versions in English as well as in French, Spanish, and the pinyin romanization of the modern pronunciation of the original poem’s characters in Chinese. At the side of the text in the vertical loop is a QuickTime movie of what appears to be a river running through woods, although it is actually an overlay of separate shots of a pathway. The silvery sheen that makes the image waver like water is created by overlaying pathway silhouettes onto one another by cutting their outlines from the original shots. In its wavering indeterminacy, the movie also suggests a gash or gap in the screenic surface, hinting at an opening, chasm, and/or corridor between the words as they appear on screen and the inner workings of the computer.<sup>59</sup> Cayley comments, “When you navigate the movie, you perform a constrained bit-map morph from one image to another.”<sup>60</sup> The movie becomes, then, a visual metaphor for an indeterminate space in which many different tracings simultaneously exist.

Underlying the complexity of this work is Cayley’s theoretical investigations of “transliterate morphing,” the technique he uses in *riverIsland* and a number of other works, particularly *noth’rs*, to morph from one letter and text to another.<sup>61</sup> To explain the process, he asks in the text file accompanying *riverIsland* that we imagine two tables of letters, a source table representing the letters of the original text and a target table representing the destination.<sup>62</sup> Further suppose that the letters are arranged in a loop of 28 symbols (26 letters plus a punctuation mark and a space), with those that sound like each other closest together. To morph a letter from the target to the source text, a minimum of one step and a maximum of fourteen would be necessary (fourteen because the transversal can go either clockwise or counterclockwise around the loop and thus never be more than fourteen steps away). To create a text in which the morphing letters arrive at their destinations on approximately the same time scale, he lets the transversal happen slowly as it begins to go around the loop and more quickly as it approaches the end points. By conceptualizing the transition from source to target through this procedure of morphing letters, the technique foregrounds the letter as an important element of textual meaning and thus locates the focus of attention at what McGann calls the prelinguistic level, in this instance letters as atomic units of language.

To illustrate the significance of this “literal art,” Cayley, in “Digital Wen,” discusses the “rules of traditional Chinese regulated verse, *lüshi*.”<sup>63</sup>

These include such considerations as line length, pauses between syllables, and tonal qualities along a line, as well as parallelism between the lines of a couplet, both in terms of the sense and correspondences between characters and classes of characters. Meaning is thus built up out of the particular characteristics of written characters and their phonetic equivalents, as well as through higher-level considerations such as imagery, metaphor, etc. Cayley argues that similar considerations also apply to poetry in English, suggesting that similarities and differences between letter forms can function as visual equivalents to the acoustic properties of poetic techniques such as assonance.

This orientation allows him to conceive of poetry through a materialistic “bottom up” approach that works in synchrony with higher-level considerations, a perspective he designates as “literal” (with a play on the letter as the unit of meaning and on the fact that the letters literally appear on the page or screen as the basic units from which meaning emerges). In addition, as the letters of his transliteral morphs travel between recognizable letter forms, they go through intermediate stages before stabilizing into the target forms, a process repeated on a larger and more visible scale as the letters in the source word transform into other letters that will eventually stabilize into the target word. The visual effect is to suggest a dynamic tension between the stabilized word (or letter) and the transitional morphs, which are linguistically indeterminate in the sense that they do not correspond to any recognizable word (or letter) but rather are the “in-betweens” from which coherent words (and letters) will emerge. In his works language falls apart and comes together, dissolving into a seethe of chaos that is not merely disorder but rather the fecund noisy matrix from which poetry will emerge.

This view of language allows Cayley to establish strong parallels between verbal language and the binary code of computer processes. It is important to note here that the morphing letters are not continuous transformations but rather quick jumps between different letters, as when the letters on a European railroad schedule spin around to form new words. This style of morphing emphasizes that letters are digital, in the sense of being discrete rather than continuous.<sup>64</sup> Further emphasizing the point is the screen on the vertical loop that shows the first word of the literal translation, “empty,” morphing into the Chinese characters through a QuickTime movie. In contrast to the alphabetic transformations, here the morphing is continuous and analogue, for there can be no table of correspondences between characters and letters; in this sense they are incommensurate.<sup>65</sup> In the other screens, however, it is the digitality of alphabetic language that is foregrounded by the discrete morphs as one text transforms into another, a performance that enacts the similarities between letters as the bits from which language is formed and electronic polarities as the bits from which the



screen image of electronic letters are formed.<sup>66</sup> Electronic text, he observes, always trembles “at the abyss of ones and zeros,” the unreadable bit stream that is the matrix out of which humanly-readable language emerges. In its general dynamics this disparity is, he suggests, not unique to electronic text (although the form it takes in binary code is specific to electronic textuality). As he cogently puts it, “letters got there first.”<sup>67</sup>

Cayley’s work makes clear that there are significant parallels between linguistic and media translation, especially the theoretical stakes both fields have in relating higher-level meaning to the atomic units of the text, whether letters or binary code. Fully appreciating the synesthesia of the visual and acoustic properties of letters by which they signify as components within larger systems of language and as expressive objects in their own right requires not only a materialist poetics but also materialist critical theories and orientations. His work points toward the larger issues involved, which open out onto fundamental questions about the nature of texts, the relation of materiality to content, and the specificities of the media in which they are instantiated. We already know language matters. Media translation and the juxtaposition it creates between print and electronic textuality can give us a deeper appreciation for the corollary propositions, that media and materiality also matter.

#### Notes

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  - 2 Dene Grigar, “Mutability and Medium,” Computers and Writing Conference, Normal IL, May 2002.
  - 3 *The William Blake Archive*, edited by Morris Eaves, Robert Essick, and Joseph Viscomi, <<http://www.blakearchive.org>> (June 15, 2003).
  - 4 Jerome McGann, *The Textual Condition* (Princeton: Princeton University Press, 1991).
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  - 6 Anna Gunder, “Forming the Text, Performing the Work—Aspects of Media, Navigation, and Linking,” *Human IT* 2/3 (2001): 81–206.
  - 7 Gunder, 86.
  - 8 *Ibid.*
  - 9 Peter L. Shillingsburg, *Scholarly Editing in the Computer Age: Theory and Practice*, 3rd ed. (Ann Arbor: University of Michigan Press, 1966), 46.
  - 10 Shillingsburg, *Scholarly Editing*, 47 (emphasis added).
  - 11 *Ibid.*, 150.
  - 12 Peter L. Shillingsburg, “Text as Matter, Concept, and Action,” *Studies in Bibliography* 44 (1991): 43–83.

- 13 Hans Zeller, "A New Approach to the Critical Constitution of Literary Texts," *Studies in Bibliography* 28 (1975): 231–265, especially 258.
- 14 Allen Renear, "Out of Praxis: Three (Meta)Theories of Textuality," *Electronic Text: Investigations in Method and Theory*, ed. Kathryn Sutherland (Oxford: Clarendon Press, 1997), 107–126. A version of the essay can be found as "Theory and Metatheory in the Development of Text Encoding," <<http://hhobel.phl.univie.ac.at/mii/pep.dir9511/msg0004.html>> (June 15, 2003). A slightly revised version was also presented at "Moving Text into E-Space" Conference, National University of Singapore, August 2000.
- 15 Mats Dahlström, "When Is a Webtext?," *TEXT Technology: The Journal of Computer Text Processing* 11.1 (2002): 139–161.
- 16 In an email dated August 29, 2002, John Unsworth comments, "I think it is important to recognize that the necessity of ordered hierarchies . . . is really a function of the exigencies of programming software to process SGML," thus suggesting that the OHCO scheme "made a virtue of necessity."
- 17 Allen Renear, "Theory and Metatheory," Section 5.3.15, <<http://hhobel.phl.univie.ac.at/mii/pep.dir9511/msg0005.html>> (September 10, 2003).
- 18 Dino Buzzetti, "Digital Representation and the Text Model," *New Literary History* 33 (2002): 61–88.
- 19 Dahlström, "When Is a Webtext?."
- 20 Jerome J. McGann, *Radiant Textuality: Literature After the World Wide Web* (London and New York: Palgrave Macmillan, 2001), 130.
- 21 In a practical sense, of course, *The D. G. Rossetti Hypermedia Archive* also aims for accurate simulation of Rossetti's materials as well; <<http://www.iath.virginia.3edu/rossetti/fullarch.html>> (June 15, 2003).
- 22 John Unsworth, "The Importance of Failure," *The Journal of Electronic Publishing* 3.2 (December 1997); <<http://www.press.umich.edu/jep/03-02/unsworth.html>> (June 15, 2003).
- 23 McGann, *Radiant Textuality*, 168.
- 24 Mats Dahlström, "Drowning by Versions," *Human IT* 4 (2000): 7–38.
- 25 Friedrich Kittler has argued that because everything ultimately reduces to electronic polarities, "there is no software" ("There is No Software," *Literature Media Information Systems*, ed. John Johnston (New York: Routledge, 1997), 147–55). One could equally well argue that the authoring associated with software extends throughout the computer's architecture, so that in this general sense everything is software, including the operations that the computer performs. The more general point is that the multiple layers of coding and bit stream information are connected in complex ways that make hard-and-fast divisions difficult to maintain. Loss Pequeño Glazier quotes David Siegel to the effect that "documents are becoming applications," a cogent observation that sums up this situation. *Digit[al] Poet(I)(c)s: The Making of E-Poetries* (Tuscaloosa: University of Alabama Press, 2002), 28.
- 26 Rita Raley, "Reveal Codes: Hypertext and Performance," *Postmodern Culture* 12.1 (2001) <http://muse.jhu.edu/journals/pmc/v012/12.1raley.html> (June 15, 2003).
- 27 *Ibid.*, 10.
- 28 Edwin Schlossberg, *wordswordswords* (West Islip, NY: Universal Limited Arts Editions, 1968).
- 29 For a fuller version of this argument, see N. Katherine Hayles, *Writing Machines* (Cambridge: MIT Press, 2002).
- 30 D. F. McKenzie, *Bibliography and the Sociology of Texts* (Cambridge: Cambridge University Press, 1986), 23.
- 31 Similar problems of identity/difference emerge in many different fields concerned with data that cluster rather than converge into a point; a notorious example is predicting future outcomes when many variables are involved. Steven Banks has developed sophisticated software to analyze such data clusters and draw conclusions from them that give workable prognostications, even when uncertainty is very high. See for example Steven Banks, "Computational Experiments for Decision Making in Complex and Uncertain Environments," *Proceedings of the Sixth Annual Conference on AI, Simulation and Planning in High Autonomy Systems*, 1996 <<http://www.evolvinglogic.com/Learn/absandpapers/computational.html>> (June 15, 2003).
- 32 *Dark Lethé*, <<http://www.innotts.co.uk/~leo>> (June 15, 2002).

- 33 David Silver has argued that such clusters should form part of the interpretive context for any text in the cluster; I am indebted to him for drawing this kind of phenomenon to my attention. In "Looking Backwards, Looking Forward: Cyberculture Studies 1990–2000," he anticipates a third phase of cyberculture studies, "critical cyberculture studies," that would include analyses of the discursive interactions between different Web sites and between virtual and real communities, *Web.Studies: Rewiring Media Studies for the Digital Age*, edited by David Gaundlett (Oxford University Press, 2000): 19–30 <<http://www.com.washington.edu/rcces/ccs.html>>, (June 15, 2003).
- 34 *House of Leaves* website, <<http://www.houseofleaves.com>>, (June 15, 2003).
- 35 Jack Post has written about this Web site at length, clearly showing its complexities and identifying it as a new electronic genre, in "Requiem for a Reader? A Semiotic Approach of Reader in Text in Electronic Literature," unpublished ms. The web site is at <<http://www.requiemfordream.com>> (June 15, 2003).
- 36 McGann, *The Textual Condition*.
- 37 Gilles Deleuze and Felix Guattari, *A Thousand Plateaus: Capitalism and Schizophrenia*, trans. Brian Massumi (Minneapolis: University of Minnesota Press, 1987).
- 38 The phenomenon of remediation is named and analyzed in Richard Grusin and Jay David Bolter, *Remediation: Understanding New Media* (Cambridge: MIT Press, 2000).
- 39 Roland Barthes, *S/Z*, trans. Richard Miller (New York: Hill and Wang, 1974).
- 40 Loss Penqueño Glazier, "Coding Writing, Reading Code," *Dig[iT]al Poet(I)(c)s*, 96–125; and John Cayley, "Of Programmatogy," *Mute* (Fall 1998): 72–75.
- 41 Glazier, *Dig[iT]al Poet(I)(c)s*, 34.
- 42 *Ibid.*, 32.
- 43 *Ibid.*, 22.
- 44 *Ibid.*, 47.
- 45 *Ibid.*, 48.
- 46 Johanna Drucker, "Theory as Praxis: The Poetics of Electronic Textuality," *Modernism/Modernity* 9.4 (2002): 683–691.
- 47 John Cayley, "The Code is Not the Text (unless it is the Text)," *Electronic Book Review*, posted December 10, 2002; modified May 26, 2003 <[http://www.electronicbookreview.com/v3/servlet/ebr?command=view\\_essay&essay\\_id=cayleye](http://www.electronicbookreview.com/v3/servlet/ebr?command=view_essay&essay_id=cayleye)> (July 26, 2003); Rita Raley, "Interferences: [Net.Writing] and the Practice of Code Work," *Electronic Book Review*, posted September 8, 2002; modified February 16, 2003 <[http://www.electronicbookreview.com/v3/servlet/ebr?command=view\\_essay&essay\\_id=rayleye](http://www.electronicbookreview.com/v3/servlet/ebr?command=view_essay&essay_id=rayleye)> (July 23, 2003).
- 48 Warren Weaver, "Translation," *Machine Translation of Languages*, ed. William N. Locke and A. Donald Booth (Cambridge and New York: MIT Press and John Wiley & Sons), 15–23. I am grateful to Rita Raley for drawing this essay to my attention.
- 49 Warren Weaver, "Foreword: The New Tower," in Locke and Booth, v–vii, especially vii.
- 50 Weaver, "Translation," 22.
- 51 Rita Raley, "Machine Translation and Global English," *The Yale Journal of Criticism* 16.2 (2003): 291–313.
- 52 W.J. Hutchins, "Warren Weaver Memorandum July 1949" <<http://ourworld.compuserve.com/homepages/WJHutchins/Weaver49.html>> (June 15, 2003).
- 53 Weaver, "Translation," 23.
- 54 Marc Damashek, working under the auspices of the National Security Agency, has created a program that comes close to realizing Weaver's dream, for it can prepare a précis of any article in any language; see Damashek, "Gauging Similarity with N-Grams: Language-Independent Categorization of Text," *Science* 267 (Feb. 10, 1995): 843–848.
- 55 Efrain Kristal, *Invisible Work: Borges and Translation* (Nashville: Vanderbilt University Press, 2002). I am grateful to Efrain Kristal for conversations and suggestions regarding his conclusions in this book, including the contrast between the views of Borges and Octavio Paz.
- 56 Octavio Paz, "Translation: Literature and Letters," *Theories of Translation*, ed. Ranier Schulte and John Biguenet (Chicago: University of Chicago Press, 1992), 152–62.
- 57 Kristal, xv. For a succinct expression of the view that a translation can be superior to the original, see Jorge Luis Borges, "The Homeric Versions": "To assume that every recombination of elements is necessarily inferior to its original form is to assume that draft nine is

- necessarily inferior to draft H—for there can be only drafts. The concept of a ‘definitive text’ corresponds only to religion or exhaustion,” *Selected Non-Fictions*, ed. Eliot Weinberger and trans. Esther Allen, Suzanne Jill Levine, and Eliot Weinberger (New York: Penguin, 1999), 69.
- 58 In an email dated September 9, 2002, John Cayley identified the movie as a “stitched/overlaid panorama” of a Canadian lake. Since a panorama typically “wraps” away from a view, this is a panorama “turned inside out,” as Cayley put it, because it wraps around the viewer’s standpoint.
- 59 I am indebted to Adalaide Morris for suggesting to me this interpretation of the image.
- 60 John Cayley, email September 9, 2002.
- 61 John Cayley, *riverIsland*, downloadable at <<http://homepage.mac.com/shadoof>> (July 26, 2003).
- 62 John Cayley, “What is transliteral morphing?,” text file accompanying *riverIsland*, email May 15, 2002; also available at <<http://homepage.mac.com/shadoof>> (July 26, 2003).
- 63 John Cayley, “Digital Wen: On the Digitization of Letter- and Character-Based Systems of Inscription,” *Reading East Asian Writing*, ed. Michael Hockx and Ivo Smits (London: RoutledgeCurzon Press, 2003), 277–94, especially 283.
- 64 John Cayley develops this point further in “Of Programmatology,” Alphabetic language, as Cayley observes, is a digital technology, a point developed at length by Robert K. Logan in *The Alphabet Effect* (New York: William Morrow, 1986). In *The Fifth Language: Learning a Living in the Computer Age*, Logan extends his analysis to digital code (Toronto: Stoddart, 1995).
- 65 Whether the set of Chinese characters can be considered digital depends on how many elements one is willing to include in the definition of digital; in entertaining this question, Cayley points out that the number of Chinese characters included in the larger dictionaries are on the order of 49,000.
- 66 John Cayley discusses the relation of line, pixel, and letter in “Literal Art: Neither Lines nor Pixels but Letters,” an essay that illuminates the special sense in which he uses “literal” to mean both the materiality of language and the letters from which alphabetic language is formed, in *First Person: New Media as Story, Performance, and Game*, ed. Noah Wardrip-Fruin and Pat Harrigan (Cambridge: MIT Press, 2003).
- 67 John Cayley, email July 7, 2002.