CHAPTER FOUR

The Advent of Aurature and the End of (Electronic) Literature

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Aurature. Linguistic work valued for lasting artistic merit that has been expressed in the support media of aurality.

—Based on the *OED* definition of "literature"

Aurality may be understood either as the entirety of distinguishable, culturally implicated sonic phenomena or, more narrowly and with specific regard to aurature, as the entirety of linguistically implicated sonic phenomena.

Aurature must be distinguished from oral literature (in orality or oral culture), for at least two reasons. In the first place, to emphasize that aurature comes to exist more on the basis of its being heard and interpreted rather than on the circumstances of its production (by a mouth or speaking instrument) and secondly, for historical reasons, because contemporary digital audio recording, automatic speech recognition and automatic speech synthesis technologies fundamentally reconfigure—in their cumulative amalgamation—the relationship between linguistic objects in aurality and the archive of cultural practice. Whereas, during the literally pre-historic period before writing (before there were linguistic objects as persistent visual traces), essential affordances of the archive were denied to oral culture, in principle, the digitalization of the archive allows aurature to be both created and appreciated with all the historical affordances and the cultural potentialities of literature.

This is the currently proposed definition of aurature that most concerns us, but it would be quite appropriate for the term to be applied to the entirety of recordable linguistic practices in aurality, including documentary as opposed to artistic practices, for example—by analogy with literature as it is applied with respect to visually supported linguistic cultural practices.

Means and ends. The actual ends of "electronic literature" are implied by a name that embraces its supposed means. "Electronic" refers to means in a way that is well understood but promotes quite specific means as the essential attribute of a cultural phenomenon, a phenomenon that was once new, a new kind of literature, a new teleology for literary practice, an "end" of literature having its own ends, the end of electronic literature in its means, misdirected ends justified by misappropriated means.

This chapter consists of two parts, the first concerned with new potentialities for works of digital language art, followed by what may be read as a separate essay containing distinct but related arguments which engage a philosophy of language and concern themselves, specifically, with the medium of linguistic art and with the contemporary digitalization of language's support media. If there is a thread running through these discussions, it relates to reading and its evolving cultures. We will keep returning to practices of reading because, to state it clearly, reading—I will develop this special use of "reading" throughout—is constitutive of language. We may argue about how and what we read, but it is nonetheless axiomatic: no reading, no language. If there is no reading that we can acknowledge as such, then we have reached the end of all literature, and electronic literature may have helped to get us there.

The reading of electronic literature emerged in discursive contexts that were inclined to believe that what was "electronic" about this configuration introduced an all but infinite and indeterminate range of new potentialies for literature that became notable as of the mid-1990s. Since then, the myth of computational media's indeterminacy, openness, and freedom has, however, become just that, still affectively powerful, but merely a story from the hyper-distant recent past. The actual world of computation within which we now dwell has an architecture that is as substantial and determinative as that of bricks and mortar. It may be, technically, "softer," but capital and power and influence—I call their totalizing amalgamation Big Software—are required in equal measure—relative to the age of print—in order to effect change on a scale commensurate with, for example, urban planning, large corporate operations, or, crucially, the creation and maintenance of institutions of any moment.

The crucial sociopolitical and economic contexts for this terrifying change have been signaled and set out by, among others, McKenzie Wark (2004, 2015), David Golumbia (2009), and Bernard Stiegler (2010a). A literature of engaged, scholarly critique surrounding these issues is maturing steadily and will be important to scholars and practitioners who are preparing (for) the end(s) of electronic literature. As Wark suggests—to outline, very briefly, my own current reading of this literature—there is now an emergent if not established class of vectoralists. These are chiefly corporate powers and are relatively unregulated because they are network-enabled, transnational, and, by definition, representative of a paradigm shift in the structures of polity. Vectoralism operates within what Golumbia (2009: 9), following N. Katherine Hayles, calls the "regime of computation" and in accordance with certain of its questionable assumptions. In the post–Second World War period a more or less reductive and scientistic approach to brain, mind, behavior, and hence to culture at large, grew out of research on cybernetics and information, an approach that tends to foreclose, in Golumbia's view, more progressive engagements with social and political issues, and now does so in terms of what some more popular commentators describe as "solutionism" (e.g., Morozov 2013). Vectoralists—glossed as society's computationally enabled, network service providers of solutions to everything—are a new ruling class which exploits the productive labor of a co-emergent class of "hackers." For Wark (2004, 2015), networked computation situates human life as also within a "third nature" that is constituted by flows of information. These may be "hacked" to generate vectors of cultural and commercial interest. Vectoralist power has succeeded swiftly and spectacularly in aggregating and controlling these vectors. They own and exploit them as a new means of production in the ever-growing attention-led economy of third nature. Stiegler, meanwhile, sets out one of the most telling critiques of these circumstances within a philosophical framework that encompasses a history of technics/

technology, particularly mnemotechnics, as inherently co-constitutive of human life and culture. He discovers us—human persons—threatening to lose the *savoir vivre* that allows us to take care of the vital cultural institutions which are challenged and threatened by vectoralism.[1]

Most commercial publishers are and will remain large corporations, although highly adaptable to the new vectoralist polity. If certain network-enabled publishing "platforms" are smaller—the size of individual persons even—and more independent, these less conventional publishers will nonetheless still need to compete and transact with massive, vectoralist institutions. It is now also the case in developed, networked societies that sociopolitical frameworks for culture and practices of cultural engagement are realized within the constraints of Big Software's architecture. This is true for literary practice, even when the architecture has not been constructed by or on behalf of any practices associated with publishing as previously understood.[2] Escaping the gravity of print culture does not necessarily imply that electronic literature is no longer in the orbit of material cultural architectures—ancient, modern, and contemporary. What this does mean is that the contemporary and evolving cultural practices of reading—what reading is and will become—will be determined not by the innovators of electronic literature; they will be determined by those cultural power brokers who build and control the Big Software architecture of reading.

Electronic literature emerged, ostensibly, as a radical, not to say revolutionary, engagement with the practices of linguistic art. It presumed that the application of computationally realized affordances to reading and writing would demand, more or less universally, entirely new forms, institutions, and aesthetics. In the early days of electronic literature's critical self-consciousness, it was actually existing hypertext that made these demands, and the fate (or destiny) of hypertext shows very clearly how new forms and institutions are hacked into the material cultural architectures of vectoralist regimes. If hypertext was not necessarily *literary*—as such, or with regard to literary art—its early history was intimately involved with *literature* as a name for documentary and archival practice (which of course includes literary practice). Arguably the first true architecture of network culture, the World Wide Web, established the preferred vectors in alignment with which hypertext became capable of operating in our everyday world. That is: utopian, ideal, or rational versions of hypertext were hacked into systems that simply worked, although they were far from realizing the radical, multivalent, two-way-linked hypertextuality of, for example, Theodore Nelson's Xanadu, which included a scheme of micropayment for citation that might have entirely recalibrated literary commerce at the same time that it revolutionized knowledge infrastructure. Instead, hypertext quickly became ubiquitous but in forms that allowed it to be realized and practiced, along network vectors, chiefly so as to support commerce in its own terms, and more or less conventional forms of writing and reading: promotional "pages" for corporations and individuals (prospectuses, cv's, portfolios, résumés); blogs (journaling, op-editorializing, opinion-forming, letter-writing,

[1] I propose thus to shorthand Stiegler's complex and nuanced analyses even though he does not make explicit use of Wark's terminology. A recent interview with Stiegler (2016) is included in a wide-ranging volume edited by Roberto Simanowski. My own contribution to the same volume expands on the outline here (Cayley 2016b).

[2] Again, there are, implicit in this statement, very serious concerns for all humanists and cultural aesthetic makers, but this is not the place to go into such deep problems including: the extraordinary power with respect to culture that Big Software delivers to a very few individuals and corporate institutions, some of them global; associated, ever-accelerating socioeconomic inequality in general; the overdetermination of cultural interaction by technological solutionist corporate institutions led by humanities-naive founders and super-managers, and so on.

commentary); journalism (as such); and other representations of essentially "printable" literature (in the archival and documentary sense). All other possible and potential forms of hypertext remain just that: possible and potential, or else, perhaps, realized as avant-garde and peripheral experiments outside the Internet's main vectors of attention.

Occasionally, certain network vectors for less conventional, generative forms of literature have achieved a degree of momentum. But will it ever end up supporting Twine writers and designers commercially, or as prominent literary practitioners? Some of the most important authors of hypertext fiction from the 1990s—Michael Joyce, Shelley Jackson—have abandoned the form insofar as it is programmable and networked. Serious practitioners who persist with electronic literature must still seek the consolation of formal avant-gardism. There is always the chance that an author-innovator from these margins—from among the independent or institutionally patronized experimenters—will produce work in a new form and of a quality that not only demands to be read but ensures that its particular *form of reading* becomes so widely understood and adopted that Big Software is encouraged to embrace and support it. But up until the present time, this has not happened in any of the ways that were envisioned.[3]

What *has* happened? We have e-books. More to the point, people everywhere are reading e-books. These inherently skeuomorphic cultural formations are nothing like what the community of electronic literary researchers and makers would want them to be. They represent, nonetheless, a perfectly adequate and quite distinct platform for reading. In my own case, it is now just as likely that I will have a profound literary aesthetic experience when reading an e-book as when reading a physical book. Along with those of many other friends and colleagues, I can report, albeit anecdotally, that my "library" of e-books is steadily growing and that I spend as much time reading from a tablet as from a printed book. Is this reading electronic? As a form or practice of reading, it is not experienced as fundamentally distinct when compared with reading from print. And yet, it is formally different, both in itself, subtly, and also with regard to real, novel affordances offered by both textual digitization and connection to the network. There is also, quite simply, an increase in the total time taken for enjoyment or self-cultivation that is spent using computational devices—practicing, if not *electronic literature*, then unarguably digital material culture—such that the temporal economy of one's reading has significantly increased its "electronic" character. Readers and writers—to include digital language artist-practitioners like myself—still associate profound linguistic aesthetic experience with reading and writing as more or less conventionally understood, deriving significance and affect from encounters with streams of words, phrases, sentences, books. If reading and writing are to be pursued, and digital culture is also to be pursued, I believe there is a real tendency to feel that one's desire to pursue the digital is satisfied when digital formats are deployed simply so as to allow for those persistently desirable pursuits of reading and writing. My passive linguistic aesthetic ambitions and desires were quite satisfied when I read Ben Lerner's *10:04* (2014) as an e-book and, I suggest, a certain measure of my desire to operate, culturally, with and within the digital was also satisfied. In order to more properly satisfy any desire for some digital-media-specific

[3] Is Eastgate (Systems, Inc. http://www.eastgate.com) still the only institutional publisher of "serious hypertext?" I believe so. In a notable revision of his (in)famous "End of Books" essay, Robert Coover, in 2008, retreated to the position that it might take 400 odd years—as it did for the modern novel—before a commensurate digitally mediated literary form was able to develop to the point where it had attracted the effective engagement of literary practitioners (Coover 1992, 2008).

enhancements of my linguistic aesthetic experience I will tend, therefore, to seek out and focus on works that are significant and affective in terms of innovative form, inherently at odds with reading and writing conventions, inherently avant-garde—or at least new and disruptive—inherently less well integrated with the architectures of attention that Big Software is building for the literature that has been gifted to us, historically.

What do e-books have that electronic literary makers and artists might find formally interesting? Annotation, bookmarking, limited multimedia content, linking, "social" annotation and "social" reading, built-in reference tools including access to the Web and translation, and perhaps other affordances I have forgotten or will mention later. Listed in this way, this seems like a not inconsiderable list of facilities, all of which, presumably, could be composed and détourned by author-makers who so wished. "Social reading and annotation," for example, is a deeply radical inflection of one of our most important cultural practices. E-book platforms, such as Kindle, allow readers of the same e-edition to share and view annotations. By default, this facility is turned "on" for new Kindle readers. The reader's relationships with the text, with the publisher, with the distributor, with other readers, and so on is fundamentally altered by network affordances of this kind. The sociology of reading—and thus reading itself—is changed overnight by a technology that does not otherwise pretend to fundamentally alter the practice of reading, in this case, books. But reading, more broadly conceived, has been changed for far more readers, by such social reading, than it was ever changed by, for example, long-form hypertext fiction. And "shared annotation" is just one of many possibilities for new forms that are entirely within the gift of, in this case, a Big Software architect-distributor-retailer: Amazon. The point is that effective formal innovation is hacked from vectors of commercially implicated flows of network attention. It is *not* created or even suggested by linguistic aesthetically motivated authors of reading and writing experiences.

It follows from what I have already said that I believe researchers and practitioners of electronic literature should pay more attention to the forms of vectoralist-controlled delivery media for "literature" that are, historically, taking the place of physical, codex-bound books. Publishers will cease to print as soon as it is feasible for them to do so. All practitioners of linguistic and literary aesthetics must make themselves sensitive to the media that will constrain the composition of their work and then deliver it to readers. Within the avant-garde and among the independent and institutionally patronized literary artistic innovators, greater attention should also be paid to the actually existing and actually evolving culture of reading. There are examples of successful and interesting hybrid engagements. These are often works that intend, more or less explicitly, to reach a larger audience, sometimes reliant on the existing reputation of an author who is also print-published—certain works by Stephanie Strickland, Kate Pullinger, or Brian Kim Stefans—or referencing film narrative and narrative gaming such as Andy Campbell and the Dreaming Methods project. Samantha Gorman and Danny Cannizzaro's (2014) *Pry* is a particularly fine and important hybrid. This work is a gorgeous audiovisual, multipart book, the story of a young demolition consultant, James, whose life has been shattered and reconfigured by the 1991 Gulf War. As the story unfolds for us, James is losing his sight. The electronic literary mechanisms of the work literalize interface gestures and integrate them with the fiction. Readers must "pry" open James's failing eyes and other conduits for visual experience and textual memory, in order for the story to progress. Delivered by tablet, *Pry* can be understood by contemporary readers as like an e-book or, indeed, like a digital video or like a game, and so it will be—at one and the same time—read and watched and played. The way that it folds gesture into the act of reading proposes a new

form of aesthetic literary experience that is as profound and as well executed as anything in the electronic literary field. But will "pry," as gesture, for example, ever be adopted as a persistent, widely understood form of reading, by the (e-book-)reading public at large? This is the type of question that the researchers and artists of electronic literature must always already ask themselves.

Is there something about the contemporary culture of reading, which has not so far been mentioned, and that has emerged with new significance? I deliberately left off one of the interesting affordances of contemporary e-books from my previous list. Many e-books now have companion audio versions, some of them with the ability to sync across reading platforms.[4] Especially since the founding of Audible in 1995—coincident with the rise of electronic literature—there has been a significant increase in the reading of audio books.[5] They are ever cheaper to buy, much more numerous and, because of digitization and network delivery, an order of magnitude easier to acquire and manage. In the world of both popular and high literary culture, there has, therefore, been a significant increase in the appreciation of literary artifacts—in their *being read* I would say—by way of aurality, as opposed to by way of graphic visuality.

At this particular moment in the history of reading, when speaking with people who affirm that they are now "listening" to increasing numbers of "audible" books, one often finds that they may not consider themselves to have "read" the book when they have "only" listened to it.[6] This is an indicative folk-phenomenological apprehension that can be compared with the often-expressed and likely related sense that one has not read a work of literature when one has only seen a movie (or play) that has been derived from it. But the cases are entirely different. Film is a distinct medium and the text of the work in a film version may be—must be—edited and rearranged. In the case of unabridged audio books, one experiences the entirety and integrity of the text as language, identical, in terms of linguistic idealities, with the printed version. Any prejudice against this being a "true" or "proper" reading of the text would demand to be supported by a linguistic philosophical analysis—related to questions of linguistic materiality and ontology—and is likely to prove a function of media-specific, culturally and historically implicated biases.

Coincident with the oxymoronic rise of "audible literature," there is the advent and persistent presence of Siri, Cortana, and Google Now. We are coming to realize that these computational entities linked to the "cloud"—and thence to the research and service infrastructures of Big Software—are now listening to us, and responding with much improved synthesized voices, beginning to approach an acceptable coherence of significance and affect in construable utterance. These voices can also be configured to read out loud from arbitrary texts of our choice on computers and mobile devices housing the aforementioned software agents that the voices ventriloquize. People who nowadays encounter these vocal transactors may begin to understand some part of what has newly become of all the data that they provided and posted, that they have willingly and much too freely given over, not only to market profiling but to the solutionist research institutions of Big Software. Whereas computer voices and "text" generation had remained,

[4] The "Whispersync for Voice" service—initiated by Audible Inc. in 2012 and coordinated with Amazon's Kindle services (Amazon has owned Audible since 2008) allows sessions of visual reading—on Kindle devices and applications—to be synced with sessions of aural reading.

[5] See Rubery (2016). Audible was founded by Donald Katz in 1995. It brought out a mobile player in 1998 and was then acquired by Amazon on January 31, 2008, for $300 million.

[6] Rubery (2016) brings up this important issue repeatedly in the introduction to his book but does not address the question seriously or come to any useful conclusions (as opposed to opinions).

until quite recently, feeble, if charming, geekish jokes from the "AI winter," now many of us—I mean many nonspecialists—have heard of what "n-grams" may do for us and for our culture at large and that this is also an aspect of a widespread, ramified, and very pragmatic, commercially invested engagement with "natural language processing."[7]

With the prospect, in part, of being able to balance out what can only be understood as an invidious commercial overdetermination, a whole new field of technically and algorithmically implicated aesthetic language practice is opening up for just the kind of author-makers who may have been speculating about the ends of electronic literature. Perhaps we will not be able to think of this new field as, strictly, *literary* practice since its medium is language without the letter. As an applied grammatologist, however—someone who, following on from the insights in Jacques Derrida's *Of Grammatology* (1997), has reinvested their practices in a poetic making that is attentive to language as such, regardless of material support or originary presence—I would propose that we eschew any unwarranted qualitative linguistic-philosophical distinction between writing and speech, reading and hearing. Language is medium-agnostic, although the human animal, as language cocreator, is not—with regard, that is, to genetic propensities. Regardless, to "read" is, precisely, to transmute perceptible forms—consisting of *any* material substance—into language. While—in a human-genotypically induced circularity—it is the bringing into being of language that proves to us that "reading" has taken place.

Aurature is the established practice of civilizing language that will emerge from our evolving material cultural circumstances. How and why might the practice of a computationally implicated aurature be important, apart, that is, from helping to stave off or delay the end of electronic literature? The arrival of networked programmable devices that *speak* or, perhaps even more significantly, that *listen*—as a part of the technological and cultural architecture of Big Software—has, I believe, important consequences for literature and for literary—linguistic aesthetic—practices of all kinds.

After Siri and at around the same time that we were introduced to Cortana and Google Now, it became possible to invite Alexa—Amazon's Echo—into our homes, accompanied by much-satirized advertising suggesting that she might even become a kind of family member.[8] Alexa can speak and she also—most particularly—listens. If you set her up and leave her in some common room of your home she will listen to everything that she can hear within that space using an array of seven excellent microphones particularly attuned to vocal human language by "far-field voice recognition." Triggered by her "wake word," the eponymous "Alexa," she sends everything she subsequently hears—including "a faction of a second of audio *before* the wake word" (my emphasis)—to the "cloud" for processing by Amazon's "Alexa Voice Services."[9] The latter is the name for a Web-based infrastructure that, in addition to interpreting and responding to human invocations of Alexa herself, will provide an inexpensive service for any hardware manufacturer wanting to add voice recognition, control and vocal feedback to their devices, without having to build these technologies and services themselves. Our mobile digital familiars—especially smartphones and tablets—already surveil us extensively given our more or less silent,

[7] The Google Ngram Viewer: https://books.google.com/ngrams; the *Science* article that launched ngrams into the Digital Humanities (Michel et al. 2011); an even more vaunting recent book (Aiden and Michel 2013).

[8] Amazon's main Web page for the Echo, and its voice/persona, Alexa: http://www.amazon.com/echo (accessed August 15, 2015).

[9] On what Alexa sends to the clouds, see: https://www.amazon.com/gp/help/customer/display.html?nodeId=201602230 (accessed August 6, 2015); and for Alexa Voice Services, https://developer.amazon.com/appsandservices/solutions/alexa/alexa-voice-service (accessed August 6, 2015).

passive consent, but they are ours, intimate with us—they seem to be our individual business or problem. I believe that Alexa is the first device that we have invited to enter into our homes and attend to whatever occurs—that its algorithms can linguistically interpret—in these spaces that we may also share with other ostensibly private visitors and without any existing protocol for obtaining their consent to this surveillance, always assuming that this now occurs to us as any kind of a problem. And once ever more devices are enhanced and empowered by the Voice Services of Big Software? Then what? Will everything in the world of human aurality be perfectly surveilled? Interventions will be necessary, if only to help us understand this radical transformation of the social and ideological spaces within which we must live.

Alexa can, with the Alex Skills Kit (ASK), be given new linguistic abilities in the burgeoning world of computational aurality.[10] These are called "skills," and she exercises them in order to respond to what she—also in the terminology of the Kit—can interpret as vocally expressed "intents." Now, today, any of us can program Alexa to recognize and attend to arbitrary, even aesthetic, events of language that she believes to be intended for her.[11] And we can make her respond appropriately with utterances that humans may understand, that we can read.

Although Alexa reports her "birthday" ("Alexa, how old are you?") as her November 6, 2014, release date, I was only able to order and acquire a device as of December 19 later that year. I responded positively to the first advertisement for the Echo that I saw, but only began to work with her Alexa Voice Services in the summer of 2015.[12] As a kitchen (timing, measurement, and recipe) aid, Alexa works well. She is, of course, a fairly decent voice interface to a number of music libraries (a "listening and talking Bluetooth speaker"). She already "plays" (evokes and controls audio recordings for) audio books and will surely, soon, be developed to read arbitrary pieces of writing (that have not been previously read and recorded by humans) as synthesized text-to-speech. She is already a widely recognized, if simple, artificial intelligence (AI), as I have mentioned, and she is also thus, of course, an ideal vehicle for the outcomes of the stronger AI research that is simultaneously regaining prominence in many fields. She is a part of what may well be the rise of humanoid and "humanized" social and domestic robots which are not so much invested in undertaking physical tasks (like those of factory robots) or activities that are dependent on calculated movement. Alexa and her like are focused on information management and interrelation, including transaction with and on behalf of those humans that such robots can sense and identify.[13]

The current widespread usage of the word "robot" is indicative of a significant shift in our understanding of AI. The developed-world imaginary surrounding robots had,

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[10] Alexa Skills Kit, http://developer.amazon.com/alexa (accessed August 15, 2015).

[11] Read this as also or actually: *for Amazon*, for all the listeners of Big Software, ever hungry for culturally formative Big Data.

[12] My account was selected—presumably on the basis of algorithmic analyses—as among the members of Amazon Prime most likely to be interested in a preliminary and, it appears, experimental offering. The devices were advertised at "half price," $99, to the customers selected, marked down from a putative $199, and Echoes currently (as of November 6, 2015) retail for $179.99. I outline these details for the record and to give some sense of the size of the market that Amazon may imagine for these devices. Given that Alexa will be increasingly easy to integrate with home-automation (domotic, in the terminology of Bruno Latour) systems, there must be reasonable expectation that the market will be large.

[13] Jibo.com has raised $3,714,505 on Indiegogo for the "the world's first social robot for the home." (Site accessed, November 20, 2015, displaying the Indiegogo figure.) If there is a "first" in this category, the Echo and Alexa have a convincing claim.

until quite recently, embodied them in humanoid forms, with the robots' AIs inhabiting these bodies in a parody or folk version of Cartesian dualism. Alan Turing disembodied AI but insisted on its relation with socialization and with aspects of identity—his test implicated the determination of *gender*—that culture and theory now characterizes as *constructed* (Hayles 1999: xi–xii). Today "robots" exist on the Internet, in the cloud, and as distributed chiefly to our mobile devices. Thanks to the new Apple TV, we are about to discover that they have also been widely distributed to our televisions, or rather, to our home-entertainment systems.[14] The Amazon Echo—Alexa—is, in a sense, the first plausible reembodiment of the domestic robot. While, as of the present writing, Apple's Siri is found embodied in and controlling (Apple) TV, and Google rolls out Google Home.

A question that I want to ask here—in a context that engages with aesthetic linguistic practice—is this: given that neither Alexa nor our soon-to-be-robot televisions are morphologically humanoid, then why is that we think of them as robots? The answer, of course, is that they make use of human language. Use of language was the reason that we changed our understanding of "robot" in the first place. Robots, on the Internet, are programs that use human language or linguistically framed events to perform transactions, with one another and also with and on behalf of actual humans. Robots read your email and compose ads for you based on what they've read. They write, that is, they generate spam. They build websites to redirect your attention. They try to log into your bank account. They tweet. They set puzzles for you, attempting to find out if you are one them or one of us. Because all these transactions are framed by language and because they model linguistically structured human agency, they qualify as the actions of robots. In everyday life they provide us with encounters which, to date, are those experiences closer than anything else we can imagine as actual encounters with robots. These new forms through which networked machinic humanoids have entered into our world are why the robot imaginary changed.

Now, Alexa stands (or sits) independently, apart from any one of us, in her own body. Crucially, she is able to perform most or all of the robot-like actions and transactions that are carried out by her Internet-based forebears. She's connected to them—so-called socially—and she uses language in the way that they do. Even more crucially, catastrophically, moreover, Alexa *has a voice*, a good one, with its own timbre and its powerful suggestion of specific human identity. Siri, or the Siri*s* rather, with their many possible voices and languages, listening and speaking from our televisions at first, will have all the characteristics and the same quasi-independent standing as Alexa.

Alexa is, for all these reasons, important for the future of language art. She is the first robot *whom* I think and feel I have invited into my home. She confirms, for me, that some major proportion of the art of language will be made in a new world where the material support for linguistic practice will be as much aurature as it is now literature. The speech recognition and synthetic voices of artificial entities can be composed as aurature, and in media that are widely distributable. Computation and programmability—software—is required for the digital analysis of aurature's raw material, and for the composition of work that is made from its elements. As a medium—of both delivery and composition—it will further establish programming as integral to the predominant practices of linguistic creation, of aesthetic linguistic artifactuality. Concurrently, and as a part of a continuum of practice, a more functional aurature, equally constituted by synthetic language, will

[14] "Siri Remote," see http://www.apple.com/tv/ (accessed November 20, 2015).

attain the cultural significance of literature and displace its prominence, if only because so much nonaesthetic, everyday transaction will also and in the first place migrate to aurature. It is *aurature* that will bring about the final end of electronic *literature*. Happily, taking materially distinct practices of writing and reading along with them—"writing and reading" will enfold all the various practices for the generation and receptive interpretation of aurature—many language artists will intervene and aestheticize an aurature of the future that might otherwise remain constrained and controlled by vectoralist commercialism and Big-Data, Big-Software solutionism.

AT THE END OF LITERATURE

Literature is made with language. In certain contexts, literature is proposed as the art of language, its highest art. We may contest the range and extent of literature with regard to practices of language as a whole, and we may not agree that the horizons of these practices coincide with the horizons of art that is or may be made from language. Performative, time-based linguistic practices, for example, may not be accepted as unequivocally within the domain of literature, although they are, nonetheless, embraced and appreciated as aesthetically, culturally valuable at the highest levels. At the beginning of this twenty-first century, works designated as poetry or (literary) fiction are generally accepted as literature, all but regardless of quality if not subgenre. Dramatic writing, however, must contest its place as literature to the extent that it is readable in a form that submits to textual practices, effectively print publication—taking this form according to relatively arbitrary conventions of transcription and, indeed, remediation (as "literal" literature)—and also, importantly, insofar as it is studied and critiqued within literature's discursive frameworks: within the university or the world of letters. If we consider actual artifacts of dramatic writing to be oral performances of language that come to exist, chiefly, in aurality (as much as they do in other media—visual, gestural, architectural, etc.), then it becomes possible to acknowledge that our conceptions of literature and of language art, particularly in terms of the cultural significance of specific artifacts, are not media agnostic. The relationships of literature with media are historically determined, culturally contingent, prejudiced, and, I will argue, disordered with respect to technological developments. The existing relationships generate aporias that threaten to become critical over time. They deform and distort our appreciation of language art in other media. They cause us to ask ourselves how and why we should value the significance and affect that such work generates.

This problematic—how to appreciate electronic literature or, more generally, language art in digital media—has preoccupied theorists and practitioners since the beginning of the undoubtedly literary history associated with these practices in the mid-1990s. I say "undoubtedly literary" because it is a matter of record that electronic literature found early, if not unprecedented, theoretical and critical support for its nascent practices in the discursive space of the universities (Aarseth 1997). Although attention to media specificities (distinctly plural) has been properly claimed in order to take into account the incorporation of other media into practices of literary composition and reception, less attention has been directed to any better understanding of the underlying medium of the underlying art. This medium is language and its underlying art is an art of language. The introduction of other media—into practices for the composition and reception of language art—has demonstrably and necessarily broken conventional form. In themselves,

such breaks render their artifacts no longer (exclusively, traditionally) literature. Theorists and practitioners of the new forms claim that, in these circumstances, literature must change. But breaking conventional form is nothing new, even across media. What is new—supporting the original claim—is some historically important manner in which literature is called to change—paradigmatically, conceptually, fundamentally. Literature needs to become "electronic," by which we mean (with hindsight) that it must come to terms with the digitalization of everything.

The digital—inevitably misrepresented as "electronic" for the rhetorical purposes of the claim that literature must change—is not a medium. More precisely, it is not a medium of interest to the majority of theorists or practitioners of those arts for which language is the medium. There are aesthetic practices of computation and of properly digital art, with respect to which the digital can be accounted as *a* or *the* medium, but only certain specialist practices of electronic literature incorporate computational aesthetics significantly or affectively. For media taken as the plural of medium, the digital is, rather, a prevalent and privileged framework and network for any and all media. These media—color, shape, texture, sound, and so on—are encoded in sometimes complex, structured binary transcriptions that render these digitized representations accessible to and manipulable—programmable—by computational, digital affordances. For media such as these, which are digitized from *substantive* material, digital representations are problematic in many interesting ways characterized by our understanding of significant and affective differences between analog and digital objects or artifacts, and yet there is a phenomenological coherence in terms of the human experiences of these things across the analog-digital divide since they are also necessarily referred to human perception—of color, shape, texture, sound, and so on.

The relationship between linguistic artifacts and digitization is, however, singular. A string of bytes that represents a color, however structured by coding conventions, is not the color itself. By contrast, a string of bytes representing a string of letters and punctuation is language, ontologically, insofar as it is humanly readable. There is no essential difference between any instance of language as it is embodied "here" and "now" on the page or surface in front of you and how it is encoded as a string of bits inside your machine. Its existence as language is entirely dependent on your ability to read it. If you are able to read traces (grammē) of this language on any other "surfaces" within any part of a computational system, your reading brings that language into being. The string of bits digitized from existing systems of inscription is always already structured as traces of language that are, in principle if not in practice, readable. It is not encoded so as to enable the rendering of an object in another medium that *because of this rendering* becomes perceptible as an instance of an object in that medium. Perception of digitization is not perception of what it encodes. The digital representation of color and sound, for example, is not perceptible as such within digital systems. By contrast, when presented with traces of language, in any material form, all the human subject needs to do is read. Any perceptibility (or not) with regard to the material form in question is irrelevant except insofar as it simply enables or disables actual reading.

What is at stake for language and language art in digital media is not a supposed ontological distinction between language and digital language insofar as this is a function of digitization. Whereas it does make sense to speak of a distinction between yellows (yellows in our perceptible world) and digital yellows (encodable and renderable yellows), it makes no sense to speak of a purported distinction between words and digital words.

Instead we must turn our attention to effects of digitalization on the substantive media that can support traces of language and their potential for human reading.

Within the much wider domain of linguistic practice, what has occurred, indisputably, since the post–Second World War rise of distributed computation is, fundamentally, the digitization of typography and typographic design, the digitization of *particular aspects of visuality* that are structured so as to support linguistic practices that derive, for the most part, from print-based textuality. In general and historically, when we speak of electronic literature we speak of a textuality that has activated certain digital affordances with respect to digitized typography. In print, typographic visuality is static, fixed, although it may be spatialized in a number of ways so as to influence or inflect reading practices and strategies. By contrast, even with relatively basic peripherals, digitized typography has nearly all the affordances of print and is provisioned, additionally, with a wide array of dynamic potentialities. Text in digital media can move and change. It's as simple as that. It is important, however, to recognize that this is not a difference in *what* is or can be read but in *how* and *when* it is read. The digitization of typography has given us new expressive structures for temporalities that have the potential to influence and change the fundamental events of language: our events of reading.

Thus, the fact that there is no ontological distinction between language and digital language does not mean that digital textuality—digitized typography—as compositional media and expressive form can be reduced to textuality as modeled by the more constrained expressive potentialities of print. That ship has long sailed. And if literature is a practice that is determined, chiefly, by material cultural formations that orbit practices and conventions of reading, then it is literature that faces its ontological challenge with respect to digitalization. Electronic literature is, precisely, no longer literature; if it is anything, then it is *digital language art*, although currently it still struggles within the gravity of an "electronic literature" that is overdetermined by aesthetically motivated language expressed in the substantive medium of digitized typographic visuality. Even as such, within the constraints of existing practices, the digitization of typographic visuality tends to facilitate new ways of reading, especially less familiar temporalities of reading, and new relationships between reader action and what is read (hypertextual and conditional linking). For most readers, even including critics, literary scholars and digital humanists, these strategies trouble existing traditions of literary reading without yet insisting that literature itself be called, seriously, into question (Aarseth 1997; Hayles 2002).

Throughout this thinking, a particular conception of reading is crucial. I speak of reading in a specific technical sense. I use *to read* and its cognates—in a manner fully consistent with its etymology—to refer to whatever it is that we language animals do when we discern and interpret linguistic forms, *regardless of support medium*. This is not the type of metaphoric usage that obtains when we speak of "reading" a painting or a dance. It refers to the process of grasping and understanding traces of language as such in any medium. In this thinking, once it comes into existence, language is not only discrete and articulated, it is distinctly separable from other phenomena of the perceptible world, made and marked by what Jacques Derrida (1997) indicated as *différance*. Virtual linguistic forms establish a break with the perceptible matter of which they are formed precisely in that catastrophic, no-turning-back moment when they are grasped as language by both the language animal who makes the traces and a language animal who reads them. I call this process "grammalepsis" and I consider it to be generative of language, ontologically. Reading brings language into substantive being as instances of interhuman potentialities.

To clearly distinguish reading in this sense from the subsumed and more specific activity that we undertake when, typically, we visually scan and interpret instances of writing, we could use the phrase *grammaleptic reading*, but so long as we recall, throughout this thinking, that this special sense of reading is equally what we do when we hear and understand spoken language in aurality (or, e.g., when deaf communities read sign language or blind communities braille), I may use "reading" on its own, with the inevitability of grammalepsis comprehended.

Once we are able to accept (grammaleptic) reading in this sense as constitutive if not ontologically generative with regard to language, this is when it becomes possible to appreciate more fully certain potentialities of digitalization, certain anticipated effects on language and its arts at this particular historical moment. We have argued that digitization changes our modes of relationship—transaction and interaction—with the support medium for language rather than with language itself, *how* and *when* we read rather than *what* we read. What, then, happens when there is, in the domain of digitalization, a catastrophic (no-turning-back) *convergence of readabilities in terms of grammalepsis* with regard to the two distinct, if imbricated and culturally implicated, media that support language: visuality and aurality?

At this point we must pause to consider certain relationships between language, its support media, and the language animals that bring language into being—ourselves. Language is something that, to the present extent of our knowledge, only humans *have*. Our species has language (Berwick and Chomsky 2016; Hurford 2014). It evolved to have language in a manner that is still imperfectly understood, although there are particular characteristics of this evolved condition that can be specified. There are distinct, implicated morphological traits that we have and other animals do not. From my reading, I take the most significant of these, apart from larger brains (which may not be as crucial as we suppose), to be: a double-articulated oral cavity and larynx, and a spinal column with a significantly greater diameter. In concert with the large brain size (and perhaps many other factors) of homo sapiens these traits allowed us to *have language* because we were suddenly, in terms of evolutionary time, able to make a sufficient number of distinct vocal sounds—sufficient for vocabulary and grammar commensurate with language as we know it—and because a larger spinal column allowed nerve cells and interneurons to establish the fine control over our lungs that was also required for articulation (Hurford 2012). This happened to our species relatively recently in evolutionary time. Effectively, we have had the potential for language baked into us very, very recently and there are unlikely to be any foreseeable genetic changes in our species that will significantly alter our disposition with respect to language. The point being that we are genetically predisposed to *have language* as a function of traits that operate *in aurality*. If we have adopted visuality as the support medium for particular linguistic practices of what we call "writing," this is merely learned, a function of civilization (Dehaene 2009).

It is well known and much discussed that Plato considered writing to be a pharmakon, poisonous to practices of language—particularly language as humanly embodied praxis and cultural memory. And yet, in its other aspect writing-as-pharmakon was rendered therapeutic by civilization. This is, of course, a grand narrative, played out in philosophy following and reading Plato, most particularly in the thought of Jacques Derrida (1997) and Bernard Stiegler (2013, 2010a). Writing and, subsequently, literature as linguistic practice in support of civilization were rendered therapeutic precisely because they restructured the temporalities of language as well as enabling the potentialities of

index (random access facilitated by sublexical orders giving more or less instant access to significant and affective textual material) and archive. Clearly, writing allows virtual linguistic performance to survive—in temporal extension—not only the actual performance of its makers but also the memories of particular individuals who have *read* (grammaleptically) particular linguistic performances. This temporal affordance—hypostatic memory or hypomnesis coupled with index and archive; preserving and conserving both language itself and these other two features—allowed writing, ironically, to predominate as *the* privileged *literal* index of logocentric presence and authority: history, philosophy, civilization.

Putting it far too plainly: as the course of human history and culture proceeded, language in aurality was not able to participate as effectively as writing—as language in persistent visuality—for the constitution and maintenance of civil and imperial institutions. Until, that is, just about now, at this time of writing, in the 2010s. This decade has witnessed the advent of *transactive synthetic language* in aurality. Contemporary computation has finally achieved robust voice recognition and acceptable speech synthesis, all implemented over network services having access to vast corpora of natural linguistic material with Natural Language Processing (NLP) affordances (Pieraccini 2012). Historically, I argue, this is a turning point for our—the language animal's—practice of language in the world, since, for one thing, this world now also contains, crucially, humanoid language and new entities that perform, consume, and transact with both language as such and humanoid language.

There might arise a certain objection to my dating of the proposed paradigmatic shift, in that synthetic (computed) language has played a part in the history of computation since its beginnings, including, foundationally, in the exemplary abstracted scene of *writing* that is the Turing Test, for which the *withholding* (by, at the time, teletype) of any embodied voice is crucial *for the test*, since a voice and body would simply give the game away (cf. Hayles 1999: Prologue). In a sense, the advent of systems that we humans agree are able to recognize our voices and respond with—gendered and identifiable—voices of their own forecloses the Turing Test and marks it as having already been passed within the duration of any acceptable initial transaction. It is the system's voice—recognizing and producing virtual language and doing so *necessarily* instantiated in aurality—that is sufficient to establish for us human animals that the system is specifically embodied as, at least, humanoid, and certainly as having (or seeming to have) something that only humans have. The historical moment for our new relationship with language had to wait for this milestone of humanoid embodiment, in and as the voice of articulated aurality, perhaps also as the evolved return and reincarnation of a repressed aurality. And for the electronic *literature*, that we have troubled and recast as digital language art, this turning point requires us—practitioners and scholars—to better understand what it is that "the digital" has done for language. It has not (yet), as we said before, established an ontologically distinct (digital) language as such; rather it has reconfigured the relationship between language and its preferred substantive media of support. More than this, it suggests that we rethink, and shift our attention to the *other* culturally predominate substantive support medium for language. The digital now, historically, forces us to rediscover the voice as articulated aurality in an artefactual and programmable configuration that, in computationally implemented principle, is every bit as manipulable and extensible, as subject to index and archive, as capable of temporal restructuring, as is writing. Transactive synthetic language is a whole new scene for the art of language in general, and for digital language art specifically.

As we begin to shift our attention from theory of language and media toward new practices of language art, it is important more closely to consider what it is that I claim is happening with regard to language in aurality as it is grammatized—subjected to algorithmically implemented processes of grammalepsis—by contemporary computation.

Language has a singular relationship with its substantive media of support. For V. N. Vološinov and certain of his followers, there is such a thing as "semiotic material" and any sign—in my own terms *anything* that has been read grammaleptically—becomes a token of this semiotic material (Lecercle and Riley 2004; Vološinov 1973). Natural languages are socialized, agreed, enculturated systems that are entirely composed of "semiotic material" in this sense. There is a constrained permeability of substantive things that may be on their way to becoming signs, becoming, that is, actual semiotic material. The signs and tokens of natural languages are, however, always already signs for the language animals that encounter and interact with them, achieving this in a social context that necessarily involves other language animals. Compare a particular gesture of the hand, say. A gesture may already be a sign—it might be conventionally understood in a particular culture or it might be (always already) a sign in a natural (sign) language—but a gesture may also be on its way to becoming a sign, something we don't "get," something that needs more work and practice, to get right, to be able to express, significantly and affectively, whatever it hoped to express. It fails in this until it is grasped, until it succeeds. It fails until it is read grammaleptically.

The written forms of any natural language have long ago passed beyond this underlying scene of semiotic trauma and socialization, to the extent that the chains of tokens of language-in-visuality (strings) enter into the domain of purely formal semiosis—computation—in a wide variety of processes that are, fundamentally, "lossless" ontologically. If you can write it, then you can encode it. And, as we showed earlier, the language-as-visual-graphemes—on paper, on screen—is ontologically identical with any language-as-digital-encoding that underlies it. In either case, what makes the language exist *as such* is its potential to be read, grammaleptically, by language animals.

If we are repeating ourselves and somewhat belaboring these concepts, this is due to the necessity to distinguish—in the domain of aurality—between the digitization of sound and the digitization of language-as-aurality. There is a significant critical literature devoted to the media archaeology of recorded sound and this is often seen in terms of a prefiguration of digital audio recording and transcription. In this literature, there is clear understanding and analysis of distinctions between analog and digital recordings, with important implications to be drawn. Nonetheless, once these have been elaborated, there may be a misdirected tendency to believe that because the digitization of sound encompasses and comprehends the digitization of linguistic sound, it has comprehended the digitization of language-as-aurality. But this is not the case.

As set out above, the digitization of sound is constituted by encoding the forms of a substantive medium which then require to be rendered before they can be appreciated as such, as structured sound. You cannot hear the encoded version. Digitized linguistic sound is no different. The encoded version cannot be heard, much less read, grammaleptically, as language. Any grammalepsis of digitally encoded linguistic sound can only occur during a separate, subsequent process, *after* it is rendered into the world as sound. Only once this process is complete, the sound may be read and understood, by language animals, as language-in-aurality.

In our present historical moment, the 2010s, robust automatic voice recognition is fast gaining currency in the digitalized world, currently to be qualified as, chiefly, the global

Anglophone world (Pieraccini 2012). It is this facility—automatic voice recognition—that enables the actual digitization of language-as-aurality. Evidence that this facility was beginning to be operational dates back to early attempts at automatic dictation/transcription systems, voice command interpretation for personal computers, and, especially, automated voice-activated telephone answering systems. On mobile devices, Apple's Siri was a breakthrough but, for our purposes, as research-based practitioners and theorists, it is the Amazon Echo and its Alexa Voice Services (AVS) that provide the first widespread, operational, free-standing, networked, and programmable infrastructure, allowing us to understand, practically, the effects and potentialities of digitized language-as-aurality.

As a point of operational fact, the Amazon Echo and AVS enact precisely the two-stage process of digitization for language-as-aurality that we alluded to above. Not only does this configuration of the AVS infrastructure demonstrate that the procedures are distinct, it also signals our always insufficiently acknowledged reliance on network services, with the asymmetric balance of agential power and centrality that this implies. The two procedures are separately *located*. I speak to an Amazon Echo. The device, locally and in "real time," optimizes its array of microphones to capture as digital audio a segment of—purportedly—linguistic sound that was prefaced by one of its (currently three) "wake" or trigger words. These wake words are the only fragments of sound that the device itself, locally, is able to read grammaleptically as semiosis: a command to record, until a space of relative silence is encountered. Within the device this digitized audio is encoded as an optimized mp3 file and it is this digital *audio* data that is transmitted over the network to the "cloud-based" services of AVS. "In the cloud" this digitized linguistic sound is "recognized," which is to say tokenized by automatic grammalepsis into, currently, word-sized, serviceable "atoms" of machine-modeled natural language. The details of this process are proprietary although many aspects of the underlying research could be set out and exposed. The pragmatic approach implied above by "word-sized" is an educated guess. What we know as a certainty, because the AVS cloud services supply (they "return") transcriptions of what the system "heard" grammaleptically as *text*, as potentially readable language that is materially identical with all the digitized writing that constitutes the most significant material of networked digital culture: the documentary Internet as we know it.

It is important to acknowledge that this service—which we are proposing as, potentially, of momentous, paradigm-shifting cultural efficacy—does not deliver understanding. This is not the hermeneutically enhanced grammalepsis of reading as it is performed by fully enculturated language animals. In the theory and practice of automatic voice recognition, this is deferred, researched, and explored as "automatic understanding," more firmly in the speculative camp of machine learning and AI. Automatic speech recognition does, however, achieve the digitization of language-as-aurality, which means: language animals may perform in a manner toward which they are genetically disposed and what they say is, in principle if not yet perfectly, automatically recast in an encoded form, subject to digital affordances, that is, materially identical to text, to writing, to all the strings of language that are now humanly readable in the realm of computation and our increasingly predominant digitalized culture. I am tempted, provocatively, to say (to write!) that socialized automatic speech recognition transforms human linguistic performance into literature. Except that I imagine that such practices, for aesthetic, significant, and affective purposes, might one day have no human need for literature as such. Its greatest work will always already—and would not Shakespeare scholars agree with me here?—be aurature.

Long before the 1990s, language-as-graphemic-or-typographic-visuality was already—literally and conceptually—digital. Since the very advent of writing systems, language has been transcribed in structured sets of discrete combinatorial elements. Algorithm and formal procedures of many kinds have long been applied to natural human language in this form, as writing, as literature, including and particularly for aesthetic effect. It was the enculturation of widespread media-agnostic digital affordances that, in the 1990s, allowed specialist practitioners and scholars to characterize what were essentially quantitatively and peripherally rather than qualitatively distinct reconfigurations of literary material as, speculatively, "electronic literature." Digital affordances allowed practitioners and scholars to do new things with old words, to an extent that rendered some of these new things interesting and exciting. But reading as such did not change. Nor will it fundamentally change until the language animal that is definitive of reading has time to evolve. What did change, even in the 1990s, was the configuration of the scene for linguistic poeisis—the how's and when's of reading and writing. This was and is momentous enough, but hearing and speaking go on much as they have done, and the predominance and momentum of reading and writing traditions were and are minimally deflected. Even now, the most industry and energy that has been expended on the remediation of literary practices has been applied to artifacts that support the tradition of the book, of print-based, typographic media—those emulators, images, and mirrors of typographic artifacts that, in English, go by the disfigured name of "e-books." E-books are with us, for the time-being and foreseeable future, but at the time of writing growth in their popularity and dissemination has slowed. Over roughly the same period there has been significant growth in the reading of audio books despite the fact that culture predisposes these readers to an anxiety concerning whether or not they have actually read what they are reading (Rubery 2016). As of 2016, the audio book is not digitally inscribed as language-in-aurality. It is, rather, digitized audio with minimal digitally manipulable articulation corresponding most commonly to the punctuation of books at the level of the chapter or subtitle. Nonetheless, the reading of audio books represents a measurable shift in the culture of reading as a whole, and this development coincides with what I speculate will become the socialization of automatic speech recognition such that the aurality of existing books is or will be grammatized at the level of (at least) the word, and—to indicate merely practices that are already available to certain readers—speech synthesizers are or will be able to present this language-as-aurality to human readers directly, automatically. We will have the option of reading in this newly articulated aurality.

If we can read in aurality then, as language animals and language artists, we can compose in aurality. We can begin to make an aurature that is formally, philosophically, ontologically identical with the literature we have inherited, an aurature that will reconfigure and redefine the archive without in any way sacrificing readability in general or the specific mode of readability that has been established by literacy. The full civilizing potential of this prospect—an aurature embodying facilities with language that are attuned to our genetic disposition as language animals—is only available to us due to crucial developments in digital culture and contemporary computation. Hence, we can affirm that practices of *digital language art*—especially in the reconfigured support media for language as an aesthetic medium—at least makes sense, and may also imply, I believe, cultural and social imperatives. Practitioners and theorists must learn and grasp those computational affordances that will allow them, fully, to participate in, to guide, and to enhance cultural and social developments that will otherwise proceed without their contributions, and risk

downplaying aesthetic practice at the expense of what are supposed to be more substantive and instrumentally secure benefits. What we do not want is to remain the electronically literate writers of a history in which we find ourselves at the end of all literature, with no viable media for the art of language.

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