

## CHAPTER THIRTY-FOUR

# Datawork and the Future of Digital Humanities

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According to the late sociologist of religion and knowledge Peter Berger, religions, in order to survive, must make the transition from “world building” to “world maintenance” (Berger 1990). In the period of world building, often triggered by an existential threat or social disruption, religious movements are sustained by charismatic leaders who promise a new order that will transform the myriad ills faced by humans in their collective project of survival into a world of lasting prosperity and justice. In the period of world maintenance, the expectation of change that brought the movement into being in the first place must be reconciled with the inevitable failure to fully realize the envisioned world. Where once prophets and mediums inspired change, scholarly priests emerge, often in collaboration with a warrior class, and build a set of institutions that can reproduce themselves, through an exchange of ritual service for livelihood and protection.<sup>1</sup>

In many respects, the digital humanities (DH) may be characterized as a movement in this sense.<sup>2</sup> Although rooted in the past—DH people often trace their ancestry to Busa’s machine-generated concordance in 1951—it began in a period of rapid cultural change, prompted by the emergence of a global, networked media ecosystem that reconfigured the public sphere and accelerated the neoliberal transformation of the university. In contrast to the measured scholarship and philosophical concerns of humanities computing, DH adopted a revolutionary posture toward traditional academia that would address both epistemic opportunities and professional crises. Although it had no major prophets, it had many shamans and devotees who gleefully espoused an ethos of play and egalitarianism, all of whom eschewed serious attempts to define the field, an act perceived as either irrelevant or in bad taste. Audrey Watters rightly characterizes the movement as millennialist, a property she associates with the ideology of economic disruption (2013).<sup>3</sup> A decade ago, I characterized DH as a *situation*, in Goffman’s sense, a metastable social arrangement in which the play of digital representation is a central value (Alvarado 2012). This revolutionary sensibility continues today as DH positions itself as a form of social activism on a variety of fronts, and expands globally as part of a general trend toward decolonization. The period of world building continues.

It is clear, however, that the transition to world maintenance has also been under way. This is evident in the establishment of DH centers and programs across the United States, although the formation of departments and postgraduate programs has not taken root to the extent that it has in Canada, the UK, and Europe. The difference is instructive; we see the emergence of two very different models for world maintenance. Although this difference appears to be the result of local

adaptations to different institutional environments, it has consequences at the epistemic level. And this is where the heart of our question lies: Whether or not DH survives, and *it* what form, depends to a large extent on the institutional vehicle it takes as it transitions from building to maintenance.

The point can be illustrated by an anecdote. At the 2015 European Summer University in Digital Humanities at the University of Leipzig in Germany, there was a panel on the topic of “Digital Humanities: Towards Theory and Applications” organized by Laszlo Hunyadi. Panelists were asked to respond to the following prompt:

Several fields of science (among them mathematics, physics, chemistry) are subcategorised into two, essentially independent but also interconnected branches, theoretical and applied: the first is aimed at discovering new knowledge about the given field, the second at applying some of these discoveries to other areas, sometimes well beyond its origin. One can wonder if the emerging field of Digital Humanities bears any of these characteristics; whether it is developing into a similar scientific field with its own independent properties. We witness as one of the strengths of DH to be the building of applications to serve wide ranges of interest across cultures, languages and technologies. One may ask: are these applications based on knowledge simply borrowed from other sciences or is DH creating its own theoretical foundations for these new developments? And going even further: can DH have an impact on the development of other (theoretical or applied) scientific fields?

(Hunyadi 2015)<sup>4</sup>

In the lively conversation that followed, two facts emerged. First, there was a consensus among the panelists (it seemed to me) to regard DH as a science in its own right, at least in principle. Second, it was conceded, after some pushback, that one of the reasons for defining DH in this way is to secure funding within the European educational systems, where, to achieve the status of maintenance, a field must become a science. Not science in the broad, ecumenical sense of any system of knowledge, but in the historically specific and socially embedded sense with which we are familiar today—empirical, quantitative, publication driven, and grant-funded. Think CERN, not Leibniz.

This admission was surprising for its transparent opportunism, but it's clear that here necessity and truth do converge. In Europe, in contrast to the US, DH is more closely associated with linguistics, in particular corpus linguistics and stylistics, and linguistics is certainly a science in the modern sense—indeed, as Lévi-Strauss argued, it is the paradigmatic human science that showed the way for all others. Still, the classification of DH as a science must be rejected in principle if not in practice. If it is a science in the sense proposed, then it is nothing more than a rebranded form of linguistics. If so, what do we make of other strongly represented concerns that have no direct connection to linguistics, such as mapping, visualization, and augmented reality—not to mention, the activist practices found in the US and elsewhere? At best, one might argue that DH has been very successful in the domain of linguistics, where the application of digital methods and the digitization of primary sources has borne the most fruit. And DH may indeed become an umbrella field within which a variety of conceptually related but institutionally balkanized fields might unite under a common head. Such an arrangement would do justice to the precarious status that linguistics has had over the years, especially in the US.

If there is a will to brand DH as a science in Europe, in the US we see movements in the opposite direction, to delegitimize DH for masquerading as a science, or for adopting its methods as it pursues another goal, that of becoming a new form of literary criticism and historical research. These come from internal critics of DH who, in effect, would rather the field become a kind of media studies, or perhaps science, technology, and society studies (STS) (e.g., Koh 2015). It also comes from unaffiliated scholars in the humanities—mainly from departments of English—who are dismayed and annoyed by the arrival of a foreign set of methods into their field, and who are incredulous that quantitative approaches can add anything to the project of interpretation (Da 2019; S. Fish 2019). An extreme element of this group regards DH as irretrievably tainted by its embrace of technology, associated with both the supposedly dehumanizing forms of rationality and the neoliberal dismantling of the academy (Golumbia, Allington, and Brouillette 2016).

The most trenchant of these criticisms are those that make the strong epistemic claim that numbers or computers can never produce anything of value to the work of interpretation. If true, then the idea of a scientific DH is a non-starter—at least in its US variant, where the focus has been on literary studies as opposed to linguistics—and DH therefore loses this institutional vehicle to move toward world maintenance. And it is clear that the end game of DH's critics is to prevent this from happening, to block what is perceived to be the annexation of their land. As with advocates of DH-as-science in Europe, its US critics are motivated by the observed connection between being a science and acquiring funding and prestige. Given the zero-sum politics of the academy, and the struggle in the public sphere to remain relevant when higher education is regarded by many as a bubble about to burst, we may surmise that the main beef that critics have with DH is not its epistemic status but its institutional one, even if their arguments focus on the former. Rather than dismiss these arguments as specimens of motivated reasoning, I believe they concern a—even the—fundamental question that DH must answer in order to survive. It therefore must be addressed directly.

Although narrowly focused on what she calls computational literary studies (CLS), “the project of running computer programs on large (or usually not so large) corpora of literary texts to yield quantitative results,” Da's arguments can be generalized to apply to any effort to study literature and culture quantitatively (Da 2019, 601). The claim, for example, that “human and literary phenomena are irreducible to numbers” is a charge against any attempt to apply digital representations to the material of the humanities, to the extent that the former involve any form of measurement or discrete and countable classification of literary phenomena, not just the works of those she addresses. Given that science is rooted in measurement, her verdict is as universal as Fish's declaration that “[t]he desire to generate insight into human expression by ‘scientific’ means is futile” (2019, 333).

A less absolute framing of Da's argument is the following. If DH is to embrace the methods of science in exchange for institutional stability, then it must accept the terms of this bargain. Its practitioners—in CLS or any other area that claims to have discovered or know social or psychological facts, either explicitly in their theories or implicitly in their activism—must conform to some conventions of rigorous and intersubjective proof. But this is where things get interesting: these conventions are by no means clear, even if we accept some basic ground rules about the definition of science, such as the essential roles played by measurement and mathematics. As Underwood points out, Da appears to believe that conventions of validity are to be found in

traditional, frequentist statistics (Underwood 2020). For example, in her criticism of literary text-mining, Da asserts that

Quantitative analysis, *in the strictest sense of that concept*, is usually absent in this work. Hypothesis testing with the use of statistical tools to try to show causation (or at least idiosyncratic correlation) and the explanation of said causation/correlation through fundamental literary theoretical principles are usually absent as well.

(2019, 605; emphasis added)<sup>5</sup>

The implied identification of quantitative analysis with hypothesis testing is telling. In point of fact, the former may have nothing to with the latter, and many areas of science have moved away from it. For example, in the area of machine learning, a subfield of the science of artificial intelligence, the Neyman–Pearson paradigm (to which one imagines Da refers) has been replaced by a set of performance measures that do not rely on p-values. In the areas of natural language processing and text analytics, an entirely different set of criteria **are** employed, based on the concept of entropy and its variant, perplexity. Da mentions these concepts in her critique, but does not grasp their methodological significance. More important, in these cases interest in causality (or even correlation) is not the norm; instead, the goal is often exploratory pattern discovery, through measures such as mutual information. Whether these results are compelling or not is a matter of perspective, but it's always easy to regard something as obvious in the perfect vision of hindsight.

Regarding the issue of genuine causal inference, hypothesis testing is not the gold standard of scientific verification that many seem to think it is. Judea Pearl has argued for decades that statistical associations expressed in the language of probability (on which hypothesis testing builds) can never be used to infer, or even represent, causal relations. For these, one must introduce exogenous, structural models that specify entities and their relations, and these usually are found in the heads of the scientists who employ statistical models, not in the latter's algebraic representations (Pearl 2009, 5). There are formalisms for expressing these models, such as structural causal models, but these are not what Da has in mind. (Nor are they required for rigorous scientific description of literature and culture.) More recently, Jeffrey Blume has argued convincingly that hypothesis testing with p-values is needlessly punitive of negative results and, in addition to the well-known problem of p-value hacking, is a source of the reproducibility crisis in the human sciences, since its use throws away meaningful results—what Da cavalierly dismisses as “non-results” (Blume 2017; Blume et al. 2019).<sup>6</sup> To this mathematical critique, we might add the speculation that p-values have been so successful because they provide the necessary binary filter required for gatekeeping in the sciences, which in turn reinforces research that succeeds within its terms.

Given the high bar that critics set for the work of CLS, and the absolute manner in which its project is dismissed, one wonders whether traditional literary studies (TLS) are held to a similar standard. Are the methods of close reading or reader-response theory any better at producing significant conclusions? Has TLS ever provided effective ways to check criticism, other than by appeals to authority? Has anyone, for example, ever really validated, much less clearly defined, Fish's concept of the “interpretive community,” or his many claims regarding how this mysterious agent brings all things into being? Are there any **non-non-results** from *this* field? We have reason to be skeptical. The truth is that practitioners of CLS on historical and literary texts are forced to invent the pre-understanding that must be shared between writer and reader required for

communication to take place.<sup>7</sup> To be sure, this is accomplished by the critic's significant learning about the context and culture in which texts are embedded—but here, too, one encounters the same limitations introduced by what Ricoeur calls the fixation and distantiation of discourse introduced by writing (1973). Given this, we might conclude that TLS has never been able to avoid the problem of projecting readers' ontologies, interests, and biases onto the work they interpret—a scandal celebrated by reader-response theory. In fact, the main problem with TLS from the perspective of CLS is not, as Moretti argues, that the critic is unable to read everything in her subject domain—a charge that only makes sense if one adopts the frequentist metaphysics of the long run, and the populism associated with it. It is that literary criticism, especially the best of it—Auerbach, Gilbert and Gubar, Said—has always been a form of high ventriloquism, in which the reviewed corpus is used to voice and legitimate the critic's own ideas, often with the purpose of advancing an agenda, laudable *is* that may be, or to become more celebrated than the authors they interpret. However naive or undeveloped current examples of CLS may be, their practitioners are openly and fundamentally engaged with the vexing problem of interpretive validity. Their efforts to produce an operational hermeneutics, whose “logics” are laid bare in code, and therefore open to the kind of investigation that Da pursues, are precisely the point.

It should be clear that statistical significance is not the essential issue here, as ripe as that topic is for critical review, and concern for the investigation of causality is, at least at this point, misplaced. What the eminent sociologist Paul DiMaggio wrote regarding social science applies equally well to the humanities:

Engagement with computational text analysis entails more than adapting new methods to social science research questions. It also requires social scientists to relax some of our own disciplinary biases, such as our preoccupation with causality, our assumption that there is always a best-fitting solution, and our tendency to bring habits of thought based on causal modeling of population samples to interpretive modeling of complete populations. If we do, the encounter with machine learning may pay off not just by providing tools for text analysis, but also by improving the way we use more conventional methods.

(DiMaggio 2015, 4)

The point is echoed by Underwood who argues that critics—and, I would add, many advocates—of a scientific DH miss the exploratory nature of CLS and other applications of quantitative and computational methods to the study of literature and culture. This work is exploratory at two levels. First, it is engaged with exploring patterns that may be induced from culturally and historically variant corpora through the application of novel methods of computer-aided reading. As many have noted before, these methods constitute a kind of scientific instrument, something like the microscope or telescope. Recall that when these were invented, they were employed with playful curiosity, which yielded substantive discoveries—the existence of cells, the moons of Jupiter. Second, and more profound, CLS is concerned with exploring the relationship between quantitative and interpretive modes of reasoning, and between the linguistic and the literary levels of description; in other words, the epistemic opportunity opened up by the fertile intersection of the humanities and the sciences. In this regard, CLS is quintessential DH—it exemplifies the serious play of representation that attends the acts of encoding, transforming, modeling, visualizing, and interpreting texts and their analytic results. Da dismisses these as “basic data work,” an aspersion based on a misrecognition of the hermeneutic nature of these processes.<sup>8</sup>

Let us embrace the term *datawork*, as it captures an essential quality of CLS, and DH more generally: the conscious grounding of knowledge in the actual work of representation, associated with activities ranging from the operationalization of a received theory to the cartographic mapping of geographic references in a work of literature. What do we learn from datawork in this sense? For one, it allows us to examine, empirically and phenomenologically, broad claims about what it is possible to know and not know, and how our instruments and media of knowledge—from index cards and concordances to text encoding schema and vector spaces—shape our understanding of the observed. One such claim is that it is impossible to arrive at new, interesting, or useful literary knowledge about texts from counting their words. This claim is made repeatedly by Fish and Da in one form or another and is axiomatic to their rejection of CLS and DH. The idea is not new; it is a dogma of TLS, inherited from the nineteenth-century distinctions between explanation and understanding, *naturwissenschaften* and *geisteswissenschaften*, and inscribed in the organization of the university, both in the taxonomy of schools and departments and in the epistemic fissures that internally divide departments, such as philosophy and anthropology.<sup>9</sup> Fish inherits this distinction, but he amplifies the difference: he places an uncrossable ocean between these two realms by insisting on a collectivist idealism that locates all agency in the encompassing will of the community. It is not surprising that he would discount that which CLS counts since, in his framing, texts as empirical objects literally do not exist but are magically instantiated when read. But not all theories of culture and collective representations need be so romantically idealist. To be sure, the distinction does receive support from computational quarters. Shannon’s mathematical theory of communication, which is foundational to the computational study of text, begins by separating out concern for meaning from the engineering problem of efficiently transmitting messages through signal media. Nevertheless, quantitative approaches to the study of meaning are not only possible but quite fruitful, as for example the study of lexical semantics by means of vector space and geometric models of text. Examples of this approach include latent semantic analysis, topic modeling, and word embedding. These approaches exemplify what Turney and Patel call the statistical semantics hypothesis (Turney and Pantel 2010, 146), which includes Zellig Harris’s distributional hypothesis, an operationalized version of Wittgenstein’s later theory of meaning (Harris 1954).

Now, I believe it is not possible to fully grasp the relationship between the statistical and the semantic without actually doing, or tracking, the datawork required to transform a text into encoded form, and then into a vector space representation (of which there are many types beside a bag-of-words), and then to apply, for example, matrix factorizations or kernel density estimates or probabilistic generative models to this representation to produce the results with which we are familiar—e.g., low-dimensional visual representations of high-dimensional spaces. This process, which is precisely deformative and performative in McGann’s sense (McGann 2003, 10), forces one to make a series of interpretive decisions that both depend on and help develop a model of text at the level of what may be called its primary discursive structure.<sup>10</sup> What becomes apparent in this process is that one never simply counts words (or their proxies as delimited strings); one is always also defining and redefining a geometric structure of containers and connections—the text model—within which the counting makes sense. And it is this geometry that connects counting to meaning, through observations of co-occurrence, distance, entropy, and other measures.

In other words, CLS—and more broadly what I call exploratory text analytics (ETA)—is never just about counting, and so Da’s argument collapses, even if some of the examples she discusses are equally silent on this point.<sup>11</sup> It is always about counting in the context of structures from which higher order patterns emerge. In Bateson’s language, it’s about discovering “the pattern

which connects” the statistical patterns which, by themselves, indeed amount to an impoverished understanding of text (Bateson 2002). I have no reservation in calling some of these *patterns of culture*, in the sense meant by Ruth Benedict and cultural anthropologists since then, such as Benjamin Colby in his early work with the General Inquirer (Benedict 1934; Colby 1966). Nor do I hesitate to agree with Bill Benzon when *we* invites us to consider some of these patterns as representing “pathways of mind” and “historical process” (Benzon 2018, 3).

Fish’s argument is harder to dismiss, since the process I describe supports his theory that the text is constructed in the process of its being read. But the structures that one discovers through working with the text, at least at the level of description indicated, namely the primary discursive structure of the text, are not put there by the analyst. They are properties of the text as real as the bones in my body. One does not need to succumb to the “hegemony of formalism” to believe this (Fish 1980, 8). Believing in the existence of something does not require one to subscribe to a monolithic theory built on the premise that it is only that thing exists or matters. (Such theories are more about building schools of thought than they are about understanding the world.)

Let us borrow the language of Fish and say that practitioners of CLS and ETA constitute a community of interpretation whose members share experience in this core process of datawork, a special case of the general DH situation of representational play. As a participant-observer, I believe this community believes that although readers’ responses to texts are authentic and not to be dismissed, they are not the only interesting things that can be said about or done with texts. They also believe that although close reading—whose condition of possibility is the print-based media infrastructure of dictionaries, concordances, critical editions, archives, and libraries—is effective and fruitful as far as it goes, it is not the only approach to making sense of texts, especially given the conditions of mass-digitization and encoding of texts in which we are embedded. In response to Crane’s question—What do you do with a million books?—this community has responded by combining the quantitative methods necessary to perceive them as such with the broad hermeneutic goals shared by their fields of origin. I believe this engagement has produced what I have called an operational hermeneutics based on a shared understanding of text that, although evolving, is remarkably consistent with the work of humanities computing as well as the deeper, pre-computational hermeneutic tradition of the interpretive human sciences. It has been articulated in pieces in various places, recently in Benzon’s theory of the corpus (Benzon 2018). For our purposes, it is worth summarizing and expanding on these views.

What is this understanding of text? To begin with, texts *qua* texts are physical (but not material) objects with statistical and structural properties resulting from the matter-energy exchanges that attend their production—through the transductive acts of recording, writing, editing, publication, and other forms of entextualization—and transmission—via documents, reproduction, signal transmission, etc.—prior to and independently of their consumption through reading, close or distant.<sup>12</sup> In this view, a text is just a finite but unfixed series of symbols, drawn (with replacement) from a finite but fixed physical (so-called material) symbol system. A text in this sense is a property of a message that survives the several transductions it goes through as it passes from production to consumption. Typically, a message is produced by a speaker or writer with the intent to convey information or to influence the behavior of another person or group of people. Of course, other kinds of messages exist, such as those that seek to express one’s experience or understanding of the world to another (or to one’s self). The text of a message is that which is copiable, and in principle perfectly copiable, from one medium to another, for example from dictation to writing to printing to reading. Something survives that process, something is transmitted through that process, and

that something is describable as a series of characters. This is true even when, as typically happens, that message is distorted, through loss or addition, in the process. Whether the characters of the message are produced by a Mayan scribe, a medieval Christian monk, or philosopher at a typewriter, the same thing is true. What differs is the shared symbol system required for communication to take place, and which indeed is the product of culture, as is the specific symbol system. This shared system includes rules of combination and a world in which meanings emerge. From this perspective, texts are like the fossils and settlement patterns studied by archaeologists who have long used quantitative methods to infer cultural and social facts from these data.

Now, what critics such as Fish and Da mean by a text is the elaborate structure of meaning, the cognitive and affective product, the fully realized understanding of a message that emerges from the acts of reading and interpretation, especially when the message is a poem or other work of literature. It is the intellectual content and emotional effect of a message fully considered, the radiant network of rich symbols, meanings, and implications evoked by the text in the reader that results from the work of reading and interpretation. For his part, Fish inherits this definition from the formalists, who conflated these two meanings of text and projected the latter onto the former, thereby fetishizing the text and its supposed autonomy from the intersubjectivity of the author and the reader.

In effect, we have before us two very different meanings of “text,” which, when viewed together, amount to parts of the proverbial elephant. As parts of a system, we may think of the two meanings, the physical and the mental variants, as constituting two phases of a single, larger process. At issue in understanding the relationship between these two kinds of text is what is often called the location of meaning, a proxy for one’s understanding of the nature of meaning. Clearly, none of the mental text is “in” the physical text; the physical text does not “contain” meaning.<sup>13</sup> The reader and the writer, the consumer and the producer, of a message must share a pre-understanding that includes linguistic competence but also an extra-linguistic understanding of the world.<sup>14</sup> Typically, this shared understanding is the product of common experience and education, through ritual processes in shared situations that synchronize cognition and affect in communities. So, yes, readers must assign meanings to the text, and these assignments take place within the context of the cultural field—the text in Fish’s sense is constituted through the act of reading. But this does not free the reader from the obligation of making sense of the text as a message sent by another, especially when the reader knows that the message was sent over great cultural distance, removed by historical time or geographic space. Readers do the work of inferring meanings in messages that they, in good faith, assume to have existed in the minds of their authors. The fact that this relationship may be disrupted by the alienation of a text from its productive situation, is beside the point. None of this eliminates the reality of the physical text.

But the point is not simply that we can assert the existence of a text independently of its reading. It is that physical texts, even though they do not contain meanings—even though it makes no sense to think of meaning and text in this way—are nonetheless essential to the production and reproduction of mental texts. And here forgive me if I slip into the language of data analysis to observe that this process is not unlike that of Bayesian inference, an observation that has been made by others. For what I mean by physical text is simply that text is a form of data  $D$ —its quintessential form, in fact—and what I mean by mental text, the interpretive product, is simply the reader’s hypothesis  $\theta$ , broadly speaking, of what an author or a source speech community means or intends.<sup>15</sup> (The reader may, of course, be toyed with: in the case of non-intentionally created texts,

for example those created by the cut-up method or drawn from the Library of Babel, which are subject to the effects of distantiation, the reader is sent on a wild goose chase.)<sup>16</sup>

Now, given this understanding of text, where does DH belong? Among the linguistic scientists or the literary critics? I believe neither. For one thing, DH is much broader than CTS, and would be impoverished by too close of alignment with either field. But more important, DH has created a new subfield in the still liminal space between the science of linguistics and the scholarship of criticism, where new forms of reasoning and sense making are being shaped in response to an emerging assemblage of media that, subject to the laws of media, have opened new opportunities for the study of mind, culture, and society. These forms are neither those of frequentist statistics nor of readerly literary criticism, and it only distorts the work of DH, CLS, and ETA to view them in these lights. But the question of an academic home, a vehicle for world maintenance, remains.

## NOTES

1. I've taken some liberties in summarizing Berger, based on my own familiarity with the anthropology of religion.
2. Whatever your view of religion, it is difficult not to see parallels between it and other social movements and institutions, including those of academia. Especially academia. We are the inheritors of religion, as is evident in the history and architecture of so many colleges and universities. Even a place like the University of Virginia, whose founder explicitly renounced any connection to established religion, nevertheless maintained that connection through systematic opposition—the orientation of the Lawn, which runs North and South, contradicts the ecclesiastic convention to orient (it's even in the word) space along the path of the sun, and so reproduces that concern.
3. This view is consistent with the Web 2.0 ethos and aesthetic adopted by many in DH at the time. The phrase Web 2.0, whose appearance coincides historically with the rebranding of humanities computing as DH (Watters 2013), expressed the utopian hope for a new world opened up the participatory web, in which individualism would be replaced by community, labor by creativity, and money by purpose. The viral success of the term must owe to its combination of a traditional religious belief—the Second Coming—with the banal inevitability of a software upgrade (Alvarado 2011).
4. The questions asked reflect the spirit of the program, whose director, Elizabeth Burr, has described DH as an epistemology, a view to which I am sympathetic.
5. Da claims to be making a “computational case” against CLS, but at no point does her argument employ computational ideas. Instead, she confounds computer science and statistics under the term “quantitative,” which, far from having a strict sense, functions as a catch-all term without a clear meaning.
6. As a more useful measure of significance, Blume has defined “second-generation p-values,”  $p\delta$  (SGPV).
7. This is a principle asserted from Schleiermacher to Shannon, by both traditional hermeneutics and the mathematical theory of communication. A shared grammar and understanding of the world is a condition of possibility for communication.
8. The dismissal of datawork also reflects a leisure class condescension towards manual labor. Later, Da writes of datawork, as in busywork, resorting to what might be called an *ad laborem* argument. As in: these arguments may be dismissed by the nature of the work they represent (Da 2020). It is a move similar to that made in previous decades against the use of the computer for literary purposes by referring to its use as mere typing.
9. Think of the not always amicable separation between analytical and continental philosophy, or of the department of anthropology at Stanford, which was at one time split into two, one to serve its scientific subfields, the other its humanistic ones.
10. I have in mind the model of text as understood by humanities computing in the 1990s (Renear, Mylonas, and Durand 1993; Renear, McGann, and Hockey 1999), but also in the hermeneutic sense,

which describes text at the level of what Ricoeur called “the linguistics of discourse” (1973, 92). To the extent that the model of text developed by humanities computing is preserved by the Text Encoding Initiative’s collection of schema (TEI), the value of this markup for subsequent text analysis is invaluable.

11. The point remains even though many text analysts miss the connection between the work of text encoders and their own.
12. Reference to the immateriality of texts raises the sticky issue of hylomorphism, which will raise the hackles of some. I simply mean to assert that texts and documents are ontologically distinct, and that the former are analytically separable from the latter. Texts are physical in precisely the sense that information is physical, that they are subject to measurement but have no mass. In other words, I follow Wiener’s dictum that “[i]nformation is information, not matter or energy” (Wiener 1948, 132). This perspective complements the materialism of text criticism and bibliography.
13. That texts do not contain meanings is a well-established point made by Wittgenstein, Shannon, and later by Reddy in his discussion of the conduit metaphor (Reddy 1979).
14. By extra-linguistic, I do not mean language-independent, but rather mental phenomena that are not in themselves linguistic but which are connected to the larger cognitive system in which language is central. One example of such an extra-linguistic component is what Hanks calls the deictic field, within which ostensive reference is made possible even when speakers are co-present and share a situation (Hanks 1987, 2005).
15. If we think of interpretation in a probabilistic framework, we may express the hermeneutic relationship between physical symbols (*Sr*) and mental meanings (*Sd*) as follows:

$$P(Sd|Sr) = \frac{P(Sd)P(Sd|Sr)}{P(Sr)}$$

Inasmuch as *Sr* and *Sd* represent what Schleiermacher called the “linguistic” and “psychological” aspects of interpretation, the formula also expresses the logic of the hermeneutic circle as a matter of updating the prior and recomputing the posterior (Palmer 1969). The analogy between the Bayesian approach to causality and the hermeneutic approach to meaning has been noted by others (Frank and Goodman 2012; Friston and Frith 2015; Ma 2015; Groves 2018; Reason and Rutten 2020).

16. An obvious criticism of my understanding of text is that it is suspiciously convenient for the work of CLS and ETA. And it is. But from the fact that one selects various aspects of an object to study, it does not follow that one has created those aspects. More generally, from the fact that one is put into a position to observe something, it does not follow that that which is observed has been created by the act of observing. If the reader is now reaching for their quantum physics, realize the phenomena in that domain are far removed from what we were talking about here. If we are going to deny the existence of physical text on the grounds of the uncertainty principle, you’ll have to do the same with other things, like viruses and climates.

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