The Perpetual Archive:
Mapping Living Archive as Inventory

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"Effective democratization can always be measured by this essential criterion: the participation in and access to the archive, its constitution, and its interpretation."

JACQUES DERRIDA, *ARCHIVE FEVER*[i]

"A state change occurs when an archived state is different from the archived state that immediately precedes it in the array."

"DETECTION AND HANDLING OF STATE FLAPPING"[ii]

Inventory is the new archive. It is strange that no one has said it before. Inventory: apprehending the records of the past in order to understand the present and prepare for the future. Today's inventories are entire living ecosystems of products, control systems, consumers, barcode scanners, warehouse shipments, Internet shopping carts. Inventory has ceased to track, merely: inventory *does*. And who would ever stop with inventory? Inventory is only always an invitation to access, a means to a (never-)end(ing).

Numerous scholars have noted that despite interest in archival projects, the definition of what an archive *is* has remained ambiguous.[iii,iv] In proposing archive-as-inventory I would like to emphasize and analyze instead what an archive *does* as essential to our understanding of archive ontology. Certainly in writing of archives as nouns I encompass the colloquial definitions commonly upheld: "a repository and collection of artifacts;"[v] "a collection of historical documents or records providing information about a place, institution, or group of people."[vi] But what is an archive without how it is used?

This paper departs from Jacques Derrida and Eric Prenowitz's impressions of

archives as enumerated in *Archive Fever*, and it proposes the notion of archives-as-inventory as a means by which the operational definition of archives might be conceived and interrogated.[1] After all, the archive is in flux. "What is no longer archived in the same way is no longer lived in the same way"[vii] and the radical changes undergone by inventories and archives alike in past decades suggest novel possibilities for the life of archives as much as they reveal fissures and elisions in our understanding of them to this point. Derrida urged that we test his hypotheses on the archive[viii] and here we will embark upon precisely this task, mapping the "new archival machines"[ix] of the 21st century onto the archive as historically construed.

A semiotic survey more than a technical analysis, my project initiates with an analysis of the secret kinship of inventory and archive before highlighting ways in which technological innovation in inventory-keeping can be seen to disrupt our understanding of temporality (a state of affairs which, if you come to accept my proposition of archive-as-inventory, is equally translatable to the *état d' archive*). The discussion continues with an assessment of how two technological innovations, the digitization of data and the development of new storage/access infrastructures (in particular that of linked data), themselves pose questions of temporality and access which technically and conceptually shape our understanding of the archives of past, present, and future.

At least colloquially we might have always been able to call archives an inventory of sorts: our stock of human civilization and history (and certainly archivists keep inventory besides). Insofar as diaries are one kind of archival record, I am not the first to propose such a link: in her history of diary-keeping, Alexandra Johnson suggests that "modern

[1] My sensibility about archives and the ways in which they are used is also greatly indebted to Walter Benjamin's notion of the *constellation* in historical study.

diary keeping owes its origins to the fifteenth century culture of accounting, when diary-like accounting books *inventoried* [emphasis added] every aspect of public and private life."[x] But neither the function of archives nor that of inventory is limited to record-keeping, and this is where the crucial link between the two arises. As Derrida wrote in *Archive Fever*:

> The question of the archive is not, we repeat, a question of the past. This is not the question of a concept dealing with the past which might *already* be at our disposal or not at our disposal, *an archivable concept of the archive*. It is a question of the future, the question of the future itself, the question of a response, of a promise and of a responsibility for tomorrow.[xi]

Doesn't this sound like inventory? Imagine inventory as it was once performed: each day or week or month or year, a shopkeeper lists his products and how many of each he has. Why? One, he sees for which products his stock is low. He can make or purchase more to avoid some future event where a customer would like to purchase one and none are available. Two, by comparing these numbers with the ones he recorded last time, he can see how many of each product was sold. Thus the information he is listing now will serve his own record-keeping, but only partially in the present in which he is recording it: its reprise comes in the future when these numbers will be compared against the next set of data.[2] Inventory is always already about preparation for the future. When we take inventory (especially of the perpetual sort which will be discussed) we continually add and subtract traces of the past (the stock) as they are needed in the present, with the goal of adequately preparing ourselves for the future. As byproduct to this process we are left with datatables and accounting ledgers as historical records of these past transactions.[3] So is our experience of archives any different?

[2] *Archive Fever*, 27. Compare to Derrida, on the archive: "if we want to know what this will have meant, we will only know in the times to come."
[3] Or we are not, in perpetual inventory.

This paper adopts its title from the eponymous accounting practice in which inventory and account balances of a business are updated in real-time based on the financial transactions of sales and returns. When integrated with automated management and just-in-time systems, inventory ceases to function as a static record for comparison or study in the ways they (and we might likewise say archives) have been conventionally understood. Instead, the very logging of an activity such as a sale is inseparable from a chain of actions, from automatically billing the customer to updating stock to flagging or reordering products.[xii] Operators on all levels on both sides of the supply chain may be involved, irrespective of geographic distance, and if they likewise utilize perpetual inventory or automated management systems then the effects continue to expand outward without the necessity of any human intervention or anything but the most negligible passage of time. This is Borge's map of the empire at one-to-one scale, not to mention at speed.[xiii] It is an archive in motion: notation and action are inseparable.

This perpetual inventory began to be developed in the 1970s in contrast to the older model of periodic inventory, and the structural differences underlying the two management systems are telling. In periodic inventory, sales and returns are registered as credits and debits to a purchases accounts, but the actual inventory account is only updated at the end of each period, when stock is counted manually. Revenue and cost of goods sold are calculated at this time, as well, by subtracting the value of the remaining inventory from all original and purchased inventory. That is to say, inventory is only considered existent if it is observed and analyzed, exterior to its daily use (for if possible, stores typically closed for inventory, or performed it outside of business hours, so as to not disturb the counting process). By contrast, perpetual inventory continually modifies

the inventory account directly (as well as tracking the sale value and cost of goods sold), assuming that inventory is existent insofar as it is entering into and out of relations in-the-world.

The difference between these two assumptions is crucial. It has temporal implications as well. If we are considering the products of exchange as our object of inquiry, we might call periodic inventory past-centric insofar as it operates based on what has (already) happened within a given time period. Records of interaction (sales) are kept continuously but stock is only assessed and historical documents of record are only produced at the time of each manual inventory count.

Perpetual inventory is present-centric in its continual modification of inventory systems in response to the purchase or sale of items. Although systems can be engineered to generate documents which record the state of inventory at any given moment,[4] perpetual inventory systems do not by nature require or produce documents; the data is used and modified rather than saved or stored.

Of course periodic and perpetual inventory are also both simultaneously future-oriented, as their utility lies largely in enabling decisions to be made about stock in response to the demands and habits of customers. This is after all the very quality that brought me to suggest inventory in the first place as an abstraction through which to analyze archives. But in one system, history is divided into periods whose effects over time are used to predict future needs over an equivalent timespan. In the other, micro-actions continually re-inform expectations for the (near or far) future.

Already this begins to suggest questions about archives which were perhaps never before manifest so explicitly. Is there a periodicity to archives— in their collection, in

[4] Documents generated now so as to be historical for the future: a self-centered archive of its own.

their organization— that is not just practically but conceptually crucial? Does (or did, as it may be changing) the archive intentionally or accidentally preserve a gap between past and present which left open the possibility for some unique kind of insight, or do micro-responses and micro-reactions let us experience things that we otherwise miss in overly broad or segmented analysis? Should time or circumstance dictate how valuable an object is to the present or future, or do we to the extent possible collect everything and let the users of archives in any particular present adopt what they need? Certainly the former suggestion is clearly bound up in the questions of privilege and power we are accustomed to treating when theorizing archives, but the latter comes with its own embedded values as well. Most broadly of all: do the structures of our archives hinder our apprehension of their full import for our present and future? If yes, how might they be rethought? Is archive-as-perpetual-inventory desirable? Presuming that "there is not [just] one *mal d'archive,*" what are the symptoms of this one?[xiv]

Here we shall begin our survey of two late 20th and early 21st century technologies with the aim of seeing what gaps it reveals about archives as heretofore conceived. Their effects on an archive of the future are better described as recursive than cyclical: like any technology, in changing the structure of the archive they also alter the content of archives and the sensibility of what is archivable or worthy of archival, which further informs future infrastructural design.

We will start with the more widespread of the two: the archival of digital forms of data. With this term I do not refer exclusively to the digitization or documentation of (physical) artefacts but also the archival of social media statuses, online-only articles, and other materials which were only ever digital. Each of these processes exposes certain

unique rifts in our understanding of archives, but there are other attributes which they both equally affect.

In first-world nations of the 21st century, online social media and blogging platforms have generated a font of firsthand content "infinitely larger than all already digitized cultural heritage and [which] in contrast to the fixed number of historical artifacts, [...] grows constantly."[xv] In 2010 the United States Library of Congress announced that it was acquiring all tweets ever published into a Twitter archive. The institution later elaborated:

> As society turns to social media as a primary method of communication and creative expression, social media is supplementing and *in some cases supplanting* [emphasis added] letters, journals, serial publications and other sources routinely collected by research libraries. Archiving and preserving outlets such as Twitter will enable future researchers access to a fuller picture of today's cultural norms, dialogue, trends and events to inform scholarship.[xvi]

Yale University professor Paul Freedman concurs. "Historians are interested in ordinary life. And Twitter is an incredible resource for ordinary life."[xvii] Over the course of recent history, the increase in literacy rates and increased access to tools and materials of publication have progressively broadened the population of individuals who produce documents available to be archived. The proliferation of online social media and blog content continues this trend, and their conflation of private and public life facilitates their archival. Democratization at last! Derrida would be proud, if only somewhat (as the dangerous archival implications of the digital divide hang heavier than ever, and as questions of access to and interpretation of the archive remain almost entirely unaddressed).[xviii] Still, now that the Library of Congress is archiving them, as soon as a tweet enters the world, it enters, or will enter, the archive. There are no gatekeepers to decide if a post is valuable, because the idea is: it is all valuable, because it got out there into the world. Put differently (but it is the same): every sale is a sale and a concomitant

change in inventory and the systems underlying it (the world), regardless of whose money was involved or what they did with the item afterwards.

This perspective alone represents a transformation in how we think about archives. Or does it? Already in drafting these impressions of the novelty of our new archival inventories, hints arise of something that has been there all along. After all, the way archival materials are often *used* is in the identification of patterns across one or more of them. If it feels painstaking for historians to reconnect the past out of the few bits and pieces that we have available, perhaps the painstaking part has much less to do with the rarity of historical archival materials and much more to do with something else.

In any case, there is one thing which digitization has not changed in the least about archives and that is their exteriority. The Library of Congress collects the world's tweets, but stores them in a Library of Congress database. The Internet Archive and Wayback Machine collect the planet's webpages, but only by repeatedly saving versions of them on their own servers.

This is something that linked data would fundamentally alter, were it enacted on a massive scale. And although the technical and practical obstacles to such a project are numerous, the technical need for some such solution is similarly massive. In the face of the enormous quantities of data which are continually generated online, storage capacities are increasing but traditional index-based search algorithms cannot keep up. We are saving everything and accessing (thus archiving, one might say) nothing. As of 2013, a single search of the 2006-2010 Twitter archive could take up to a day, which is why the Library of Congress has yet to open the archive to researchers.[xix] An archive unopened, by operational definitions, is an archive only in promise: of what it will become on that

future day when it will be utilized. So if there is, as the Library of Congress suggests, a vested archival interest in collecting the ephemera of everyday existence, there is a concomitant vested need to employ systems and data architectures which make the use of those documents manageable. The most productive means to analyze and process massive semantic datasets known to date revolve around the tagging and linking of content.[xx]

Proposed by Tim Berners-Lee, founder of the World Wide Web, in 2006, linked data provides one possible solution, but its effects on archives would be radical. Exteriority would be abolished; archives would be lived: updatable, distributed, mutable, remixable. Linked data represents an intermediary layer to the Internet between that of content stored online and the human user experience of browsing. This machine-readable semantic web consists of individual data units (individuals, geographic locations, documents) whose relationships to other related data units are made clear via links.[xxi] These links are not the same as HTML hyperlinks, although both are kinds of uniform resource identifiers (URIs). Instead, links in linked data are described by the RDF protocol which specifies, for each RDF statement, not only two object "pages" (URIs) but also the way by which these two items are related. In the language of linked data, each RDF statement is a *triple*: the *subject* and *object* are URIs which represent the two resources in the relationship and the *predicate* describes the nature of their relationship.[xxii] For example, in "Friend of a Friend" (FOAF), one of the earliest linked data experiments revolving around social networks, predicates included "firstName," "lastName," interest," "skypeID," and "knows."[xxiii] What is important to note about this approach is that the object of each of these predicates is intended to be not a textual description but a URI link to a specific

object page.[xxiv,5] In an example where "Dario" "knows" "Karla," *Dario* and *Karla* would each have a URI which houses all information about them, including their respective interests, Skype IDs, and several statements of which other URIs (people) each *know*s.

If linked data does not sound entirely alien as a concept, it may be because hyperlinks particularly in densely networked websites such as Wikipedia and Facebook provide a familiar human-level mimicry of the structure of linked data. My Facebook page lists my interests, hometown, and favourite books, as well as who my friends are—and clicking on any of their pages in turn shows their interests, hometown, favourite books, and of course their friends. What differentiates linked data is two things: one, as a format it is not proprietary; in fact it is designed to ease the compilation of resources across organizations and webpages into a more or less seamless "global information space,"[xxv] although it is up to users whether their data is not just linked but also open and accessible. Two, linked data is meant more for machines than for humans (although through the right interfaces humans can interact with it). The implications of this latter feature occur at the structural level of the code. By way of explanation: on a Facebook profile, we understand that "hiking" is an interest of Karla's because we see this link in the profile section labeled "interests." A machine which encounters that page would have no such cues, not necessarily understanding English semantics nor vocabulary, and would need the relationship between Karla and "hiking" to be made explicit by some standardized computer-readable format. Incidentally in 2011, Facebook began transitioning its profile data into RDF format to enable precisely the kinds of linked data searches which might change the utilization of archives.[xxvi]

[5] W3C, 2014. When appropriate the linked data guidelines do permit an object to be a String literal (ie: a phrase rather than a URI link) or alternatively a *blank node*, i.e., a generally defined type of object (such as a "cypress tree," without needing to specify a particular cypress tree with a particular URI).

The idea, as linked data pioneers Christian Bizer, Tom Heath, and Tim Berners-Lee state, "is that a user may begin navigation in one data source and progressively traverse the Web by following RDF rather than HTML links."[xxvii] That is, no longer would any individual or organization be in charge of determining what related data is relevant and useful and what is not. Democracy again! In the fullest implementation of linked data, all known and uploaded data about an object, date, artifact, location, person, movement, or event would be accessible by means of aggregated RDF links. Even without RDF data, the uploading of non-proprietary cross-platform database filetypes provides a starting point from which relationships could be identified and recorded. Crucially, all documented facts and relationships would be *searchable*, because not only we but also machines are able to parse this information, at processing speeds far in excess of that of the human brain. Linked data provides a networked model of the world. A fluid worldwide system of linked data would mean that each individual new discovery, wherever in the world it occurs, would have instant and manifold effects on the system as a whole, not necessarily in the altering of any one page or entity so greatly as in terms of the linked connections it renders manifest.

Most radically of all, linked data could hypothetically occur in vivo. Think of the way that social media usernames and handles, embedded in an individual's status update, link to the page of another user. This is the mechanism, on a richer semantic level, by which linked data functions. It is for this promise of data which is easily augmented and amended based on real-world activity, with immediate systems-level repercussions, that I propose that linked data and perpetual inventory share a similar operational logic; that is, that linked data serves as a kind of massive distributed instance of perpetual inventory.

There are enormous technical and practical challenges involved in the preparation of linked data, even for a relatively specific archive, let alone across a broader, more ad hoc coalition of organizations. Verifying the accuracy of data and validity of the code is one such challenge, although Wikipedia demonstrated the viability of a crowd-sourced albeit regulated scholarly project.[xxviii] Jumping from server to server to obtain data is computationally costly, and the time and technical knowledge required to generate quality linked data in the first place is far from negligible. Still additional difficulties are posed by the removal of content after it has been linked into the system: to cite a problem equally generalizable to contemporary archives more broadly, a 2014 study at Harvard Law School found that over 70% of the URLs cited in the texts of three legal journals suffered from "link rot;" that is, the materials were no longer available at the URL specified because of the site owner deleting or updating the content or changing its web address.[xxix] The development of Harvard's Perma.cc permalinking platform, as well as those of the Internet Archive, provide solutions to the problem of citation, but of course, only by maintaining the ontology of archives as necessarily exterior.

A deep analysis of the practical challenges surrounding linked data models is outside the scope of this paper, although such a project would be valuable as several archives use or are transitioning to a linked data model. Rather our project will be again constrained to a semiotic investigation. Insofar as linked data archives do exist, and given that such a framework may be increasingly used to address the massive quantities of data currently being archived, how does archives-as-linked-data (we will see this is not so far from archives-as-inventory) change archives? What is gained, lost, and changed when archives cease to be unitary entities, and become instead only momentarily assembled pieces of an

amorphous and constantly changing information landscape?

One possible response is, nothing at all: archives have always been this way, and this notion of archive-as-inventory only serves to highlight how deferred the presence of archives always and already was. As Paul Voss and Marta Werner reflect, "The *poetics* of the archive [...] is a poetics of re-collection, of re-membering, in which all proofs are provisional and subject to re-vision."[xxx] It has always been the case that new documents and artifacts get discovered which suggest a reorganization of the historical relationships we have deduced up to that point. In fact the more information and fact-correction, both of which a linked data model promises, the better. Inventorial archives which are perpetually updated with even the most minute information come that much closer to the "archive's dream of perfect order" which perhaps has only *heretofore* been "disturbed by the nightmare of its random, heterogeneous, and often unruly contents."[xxxi] If we imagine an ideal archive, free of any technical considerations or practicality, what is in it? Everything? Everything written? Everything made? A Noah's Ark split at the seam: one of each item produced? Or only each item produced by the human hand? Would photographs and schematics thereof suffice, or do we need the breathing animals themselves? Borges comes to mind again, this time with his infinite library[xxxii] as well as his city-sized map. Voss and Werner assert that "the archive is necessarily established in proximity to a loss— of *other* citations, citations of *otherness*"[xxxiii] but is this true only because of our technical inability to retain everything, or even in our most idealized conception of the archive is there some kind of selection process inherent in what we decide to preserve? Our answers may already begin to tell us something about archives.

There is another elephant in(side) the room, or ark(/chive): hadn't we agreed there

was “no archive without outside”?[xxxiv] Theorizing archives as (perpetual) inventory, alongside the technical possibility that linked data could serve as an archive *in vivo*, negates the necessary exteriority theorized to archives. Or else negates the notion that this form of linked data qualifies as an archive at all. Or else cracks open a much more troublesome reality underlying archives even of today and certainly those of the future. To examine each, in order of ease of response:

One, negation of linked data as archive.

Is there anything about a server full of linked data which prevents it from being a “collection of historical documents or records providing information about a place, institution, or group of people?”[xxxv] Is there anything about linked data which prevents it from qualifying as information from the past which is used to understand or prepare for the present or future? Presumably the terms “historical” and “past” are the ones causing the trouble, even as pages on, for example, the Internet *can* be historical (but they might have been altered since then). Well those alterations occurred in the past, too, so what makes them any less historical after being edited? Our own present-day archives are full of edited and altered documents: published texts, the Bible, the final versions of political speeches. Crucially however, they weren’t edited or altered once they were in the archive. That is in short the point of archives and that is the point of exteriority.

The issue becomes clearer when we return to our abstraction of archive as inventory. After two years a keeper of periodic inventory is left with some number of inventory records, all indicating past statuses corresponding to states in the world; the keeper of perpetual inventory is left with potentially only one which is what is being used to make

decisions in the world at that moment. What does this look like in an archive? *Is it* an archive? The fissures in our metaphor that seem to prevent a total eclipsing of archive by inventory are relevant as well, for the archives are not (just) the records of stock but, in this terminology, they are often the stocked assets themselves.[6]

An archive-as-inventory would be an archive which expends part of itself with every access. An archive badly kept, the ink bleeding on parchment after years of contact with the oils of human skin. Or Stephen Colbert's humorous and terrifying wikiality, a past entirely rewritten in response to popular demand.[xxxvi] Or perhaps something more subtle: an archive which amends itself with every access, in response to the connected history of events of which it was and continues to be a part. In which case it looks rather like the archives of today, when it is in use.

Two, negation of exteriority.

Here is a vision of a linked data future: on the Library of Congress website, instead of accessing a saved copy of a tweet, you access the URL of an actual tweet. This means that at long as there is a Twitter, you view everything about the tweet as of the time that you accessed it. You can see retweets and favourites from the entire span of time which has passed from the publication of the tweet until now. You can reply to the tweet from your own Twitter account, thus potentially sparking a renewed flood of tweets in response. If it were Facebook and not Twitter whose archive we were traipsing, the publisher of the status update might have edited the text five years after its original publication, and there

[6] Often but not always. A written record of a political speech might enter the archive, serving only as account of that which actually happened; a digitized diary might or might not be semiotically reducible to the physical diary itself.

is no way to know what had changed.[7] This is archive as perpetual inventory, and as Harvard's study of legal journals showed, in a world of updates and address changes it is not so unlike what we are living in now.

On the other hand, let us return to the example where you reply to this ancient tweet from your own Twitter account, today. The past is brought to life again. The archive is open to be read, if not altered (by anyone, even by you, person-of-the-future), put into new context: *this*, finally, is the kind of democracy of archives about which Derrida wrote!

But here again, that persistent nagging... what, if anything, has changed? The form of the archive, yes; the faithfulness-of-the-archive-to-some-kind-of-fixed-past, yes, insofar as we can say anything about this to begin with. For even with our archives today, is there not an extent to which this is what we are already doing? Dragging documents and objects into the time machine which is an archive, ripping them out of their context, and then using them to try to (re)construct an understanding of those very conditions from which they were pulled?

Of course this and the above question are in some ways the same: are archives categorically exterior, outside? Or has their exteriority been at best a historical but contingent necessity and at worst an illusion?

Thus, a troublesome reality.

After all, even if the items in an archive are meant to not change, our understanding of the past of which they are a part is changing all the time. Even in a hypothetical

[7] As of the time of this paper's publication, Twitter does not permit the editing of published tweets, but Facebook permits the editing of posts.

completely static archive where no material is ever added or subtracted, we could always create new constellations of meaning out of the archived materials based on our apprehension of them in each unique present. Borge's library contains everything that was or will be written, but the human experience moving from book to book still provides personal and social insight, even if what could be written about it already has been. After all, without the ability to find that book as needed, it may as well have not been preserved at all.[8]

Already this key fact has been shaping the archive in ways that are typically elided over. For if an archive is to *do* and not just to *be*, it requires a means by which it can be accessed, interacted with, searched, and organized. Whether this is through call numbers, keywords, or queries within linked data sets, there is always a level of present-day annotation placed upon the records of the past. This present-day assessment of the relations among artefacts shapes our use of archives.

Adrian Mackenzie's reflections on what digitization in general has done to the archive provide a striking assessment of this interaction-based information landscape, although the extent to which these circumstances were not always-already the state of archives is debatable. In 1997 he wrote:

> Not only does the structure of the archive increasingly determine the coming into existence of its contents, these contents exist as real-time deferred. They come into existence solely in view of a possible presentation on the screen, a presentation that will be governed by the horizon of real-time.[xxxvii]

For Mackenzie, the loss through digitization of a sort of presence of archival objects has significant conceptual repercussions. In such a system, because of the realtime,

[8] To return from the library to the stockroom, we might also call this the safety stock, in the metaphor of inventory: available in record or name only and thus invisible to most, dormant in a warehouse somewhere. Or worse but equally possible, the surplus stock lying instead dormant on a shelf, here at hand but unused. Taking up space, never entering world; what error in predication led us to even buy this?

trigger-based mode of interaction with content, historical information seems to exist exclusively in service to the present. What digitized archives provide in substitution of temporality is "the feeling of being-within a space of culture."[xxxviii]

The digitization of documents, for example, separates the text of a document from its material existence. What does this do to our archives? The highly snippets-based, object-oriented qualities of digital information including linked data only exacerbates Mackenzie's precautions. An artefact is no longer the unit of analysis: a word or a phrase is, comprising rawer bits and pieces than we might typically consider the object of archives. The inter-linking of data objects within linked data would extend this further. But were our annotations upon and categorization of archival materials not already doing much the same thing? Apprehending a word, a movement we consider a text or object to be a part of, based upon what else we know about its creator or creation: making *this* the keyword that can be searched, by which this artefact can be found and studied. If anything, the inclusion of an *entire* text, the linking of information about an object to *everything* known about it, provide information that is richer and *less* subject to modification from the present than our old manually categorized archival systems, and let us be honest that there is little use to our archives without some kind of indexability. Archives as inventory actually reminds us that the line items we've recorded refer to objects *out in the world*— out in the world and not elsewhere (for example, on an ark, or in an archive)— which have entered the inventory for this very reason (their effect on this world and our understanding of it). Perpetual inventory is *livin*g inventory and living archive. Linked data replaces the reference to out-in-the-world with the thing-in-itself, out there, connected to myriad other things-in-themselves at the most local levels.

Such a system is inherently spatial, as Mackenzie emphasizes. And its spatiality generates other effects as well. In privileging associative, topological relations, other relations wane. Literary fiction and historical fact (not to mention commentary on both) occupy the same space, becoming difficult to disentangle. Whether this is also true or not of our paper and parchment archives depends on the organization of each. If the loss of the material body of archival documents was ever troubling, or liberating, the loss of any kind of historical, unitary whole to speak of may be even more.[9] Derrida's own *trouble* is equally at stake: "an archive ought to be [...] open to and shielded from technical iteration and reproduction."[xxxix] Stripped of both material and even textual contextual clues, digital archival documents in general— and those structured as something like linked data in particular— become increasingly atemporal objects, outside of time and perhaps even outside of their own self-constructed space. Their existence is only as an assemblage of words or colours or forms, which co-arise only by happenstance, and which can be separated and apprehended piece by piece just as easily.

And yet perhaps this is only to be expected, if archive is inventory. After all, perpetual inventory doesn't even create historical logs anymore:[10] the record lives on in line items alone and in the changes in the system that it has wrought. Just as we observed that the recording of information in perpetual inventory (a sale) and the acting upon that information (billing a client, ordering more stock) could technically be compressed into a

[9] More broadly, the naturalization of contingent relations seems to be a major risk possible in the use of linked data models for archival material. I will not go into much depth because the specific technical implementations of any such archive will greatly affect the extent to which this is the case. But it does seem worth noting that while searchability of data provides a great benefit to researchers, the associative logic that informs the technical foundation of linked data is at risk of being translated into the user operation experience. This very postmodern approach to the archive may or may not be welcomed.

[10] As described earlier, of course it *can* do so by saving a copy of the databases' current state, but the production of documents is not necessary for the function of inventory as it is in periodic inventory, where the documents themselves are utilized to make comparisons across records.

single activity without explicit intervention, "real-time interactive processing [...] appears to overcome the dislocating intervals between perception and action."[xl] With anything bigger than single units and line items, the relations between the entities at hand are already too fixed to be able to do anything at all. Inventory and so this new archive as well are alive, transmutable, meant to be used, read, accessed, and altered, not viewed or worse, stored in stagnancy like so much periodically counted product stock. Are we missing something here?

Or is it that inventory is the new archive only because we are in a historical moment that is quite unlike the one in which our old archives were debuted and debated? Medieval scholar Thomas Pettitt has proposed the Gutenberg Parenthesis to describe the notion that the period spanning from the 15th through 20th centuries represents an anomaly in the history of human communication for its emphasis on cultural products as original, autonomous documents. For him, Internet culture with its remixing and recontextualization is not a novel circumstance but rather a return to pre-Gutenberg folk culture of collective, performative, vernacular discourse,[xli] or, as one journalist describes it, "conversation, gossip, the ephemeral."[xlii] As for internet culture, so too for linked data and so as well for archives-as-inventory, which it increasingly seems may be more or less the only way we are experiencing archives anyway. If collective, conversational discourse is reified— and the Library of Congress's acquisition of Twitter records indicates that it is at least of interest— then history becomes as much a game of numbers (popular vote) and pattern-seeking as anything. Was it always? And wasn't this also always the great responsibility of the archive (and of arks)?— to preserve and prevent erasure, in order that all true patterns may be one day unearthed?

Seen as such, the reason for this preservation modality of the archive seems, counterintuitively, to be the extension of the past into the (present) world. In a theorization of archives as delineated and exterior, to enter the archive means to exit the world, but to exit the archive is to exit from history and is synonymous with horror. To enter inventory (of the perpetual kind) is to enter the world (or rather, by entering the world one enters inventory), but with the continual possibility that the entities which have entered are altered (thereby forcing the originals into an exit which is so silent it disappears entirely if it hasn't been recorded elsewhere, i.e., exteriorly). Yet preservation at all costs signals one's de facto exit as well, through disuse.

How can we reconcile the distance and exteriority of the archive with the future orientation of the inventory-archival impulse? Are these gaps that are revealed by digital archival methods the ordinary growing pains of infrastructure or symptoms of a veritable mal d'archive? Temperature rising and time disappearing until it signifies only that empty space we crave in between the throbs of our aching head.

Either we are stuck, feverish, or we must take stock.

Notes

[i] Jacques Derrida and Eric Prenowitz, "Archive Fever: A Freudian Impression," *Diacritics*, 4, no. 2 (1995): 11.

[ii] Ethan Galstad, "Detection and Handling of State Flopping," http://web.archive.org/web/20150715185538/http://nagios.manubulon.com/traduction/docs14en/flapping.html.

[iii] Derrida and Prenowitz, "Archive Fever", 57.

[iv] Marlene Manoff, "Theories of the Archive from Across the Disciplines," *portal: Libraries and the Academy*, 4, no.1 (2004): 10.

[v] Ibid.

[vi] *Oxford English Dictionary*, s.v. "archive," http://www.oxforddictionaries.com/us/definition/american_english/archive.

[vii] Derrida and Prenowitz, "Archive Fever", 18.

[viii] Ibid., 11.

[ix] Ibid., 15.

[x] Alexandra Johnson, *A Brief History of Diaries: From Pepys to Blogs* (Hesperus Press, 2011), quoted in Tom Cunliffe, "Review: A Brief History of Diaries: From Pepys to Blogs - Alexandra Johnson," *A Common Reader*, October 10, 2011, http://www.webarchive.org.uk/wayback/archive/20121205103150/http://acommonreader.org/review-a-brief-history-of-diaries-2.

[xi] Derrida and Prenowitz, "Archive Fever", 27.

[xii] For example, Douglas Page, "Automate Your Supply Chain and Reap the Benefits," *Hospitals and Health Networks*, May 1, 2011, http://web.archive.org/web/20150715191246/http://www.hhnmag.com/Magazine/2011/May/0511HHN_FEA_MostWired.

[xiii] Jorge Luis Borges, "On Exactitude in Science," in *Collected Fictions*, trans. Andrew Hurley (New York: Penguin, 1998), 325.

[xiv] Derrida and Prenowitz, "Archive Fever", 19.

[xv] Lev Manovich, "Trending: The Promises and the Challenges of Big Social Data," in *Debates in the Digital Humanities*, ed. Matthew K. Gold (Minneapolis: University of Minnesota, 2012), 461.

[xvi] Library of Congress, Update on the Twitter Archive at the Library of

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[xvii] Christopher Beam, "#Posterity: How future historians will use the Twitter archives," *Slate*, April 20, 2010, http://web.archive.org/web/20140219102826/http://www.slate.com/articles/news_and_politics/politics/2010/04/posterity.html.

[xviii] Graeme McMillan, "Huzzah! Library of Congress' Useless Twitter Archive is Almost Complete... But You Can't Read It Yet," *Digital Trends*, January 7, 2013, http://web.archive.org/web/20150714212358/http://www.digitaltrends.com/social-media/library-of-congress-useless-twitter-archive-is-almost-complete.

[xix] Ibid.

[xx] Jonathan Shaw, "Why 'Big Data' Is a Big Deal," *Harvard Magazine*, March-April 2014, 30.

[xxi] Tim Berners-Lee, "Linked Data," July 27, 2006, http://www.w3.org/DesignIssues/LinkedData.html.

[xxii] W3C, "RDF 1.1 Primer: W3C Working Group Note 24 June 2014," http://www.w3.org/TR/rdf11-primer.

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[xxiv] Berners-Lee, "Linked Data."

[xxv] Christian Bizer, Tom Heath, and Tim Berners-Lee, "Linked Data - The Story So Far" (advance online publication, 2009), *International Journal on Semantic Web and Information Systems*, http://tomheath.com/papers/bizer-heath-berners-lee-ijswis-linked-data.pdf, 1.

[xxvi] Jesse Weaver and Paul Tarjan, "Facebook Linked Data via the Graph API," *Undefined*, 1 (2012): 1-6, http://www.semantic-web-journal.net/sites/default/files/swj282_1.pdf.

[xxvii] Bizer, Heath, and Berners-Lee, "Linked Data," 10.

[xxviii] For example, Jim Giles, "Internet encyclopaedias go head to head: Jimmy Wales' Wikipedia comes close to Britannica in terms of the accuracy of its science entries," *Nature*, 434, no. 7070 (2005) : 900-1.

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[xxx] Paul J. Voss and Marta L. Werner, "Towards a Poetics of the Archive: Introduction," *Studies in the Literary Imagination*, 32, no. 1 (1999): ii.

[xxxi] Ibid.

[xxxii] Jorge Luis Borges, "The Library of Babel," in *Collected Fictions*, trans. Andrew Hurley (New York: Penguin, 1998), 112-118.

[xxxiii] Voss and Werner, "Towards a Poetics of the Archive,", ii.

[xxxiv] Derrida and Prenowitz, "Archive Fever", 14.

[xxxv] *Oxford English Dictionary*, s.v. "archive."

[xxxvi] Stephen Colbert, "The Colbert Report, Wikiality," Video, *Comedy Central*, July 31, 2006, http://web.archive.org/web/20080308053730/http://www.comedycentral.com/colbertreport/videos.jhtml?videoId=72347.

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[xxxviii] Ibid., 62.

[xxxix] Derrida and Prenowitz, "Archive Fever", 57.

[xl] Mackenzie, "The Mortality of the Virtual," 61.

[xli] Thomas Pettitt, "Before the Gutenberg Parenthesis: Elizabethan-American Compatibilities," 2007, presented at Media in Transition 5: Creativity, Ownership, and Collaboration in the Digital Age, Plenary 1: "Folk Cultures and Digital Cultures," Boston, MA, April 27-29, 2007: MIT, 2, http://web.mit.edu/comm-forum/mit5/papers/pettitt_plenary_gutenberg.pdf.

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