10. How Eva Louise Young (1861–1939) Found Me

On the Performance of Metadata in Knowledge Production

Iris van der Tuin

Abstract
Human knowers in academic settings today are caught up in computational procedures. Such procedures have constraining and surprising effects on the "findability" of scholars and scholarly works. This chapter argues that, and shows how, digital literacy is beneficial for epistemological and methodological reflection and creativity during the research process. Unraveling the intricacies of the chapter's author meeting a "forgotten" philosopher—Eva Louise Young (1861–1939)—in a situated human–computer interaction meant acquiring the competence of being critical of, and creative with, Google's functioning.[1] It meant learning that, in today's algorithmic condition, canonization and knowledge production are complicated *posthuman* entanglements. Literacy here means combining tool criticism and creativity from media studies with bioinformatical practices of data and information storage, labeling, and retrieval in dynamic settings.

Keywords: algorithmic functioning, creativity, digital literacy, doing research, findability, human–computer interaction

In October 2016, I met the British philosopher Eva Louise Young online. Young was born in 1861 in the Punjab in the former British colony of India,

1 I presented this case study first in a keynote at the *8th Annual Conference on the New Materialisms* in Paris in 2017 and included the case in my 2018 inaugural lecture as well (see van der Tuin 2018).

Es, K. van & N. Verhoeff (eds.), *Situating Data: Inquiries in Algorithmic Culture*. Amsterdam: Amsterdam University Press, 2023
DOI 10.5117/9789463722971_CH10

and she died in Letchworth Garden City, England in 1939. Back in 2016, I was searching for literature in the field of posthumanist theory via Google Books on my laptop, and Young's book, *A Philosophy of Reality* from 1930, appeared as one of the search results. Nothing about the scanned pages of the book that appeared on my screen after several mouse clicks made it explicit that its author, E. L. Young, is a woman, yet Google Books' sidebar made mention of "Eva Louise." While I was not looking for a publication in metaphysics, I allowed myself to be distracted by this record, dynamically sourced from library metadata in response to my search terms, search history, and user profile. It struck me that I was unfamiliar with the author (I thus immediately critiqued processes of philosophical canonization), but I also realized that she had the potential of becoming important to my feminist research (I was thus immediately creative with the search result in the hope of broadening posthumanism's knowledge base). Using the internet, I was quickly able to uncover several additional facts: Young wrote only a single philosophical monograph, and beyond the 1930s, her work has hardly been referenced. Furthermore, reviews of the book in the 1930s were predominantly negative, and many of the reviewers were mistaken about her gender. I also noticed the difficulty of finding information about Eva Louise Young online; simple Google searches generated few results. In sum, Young has been effectively erased from history (i.e., *eclipsed from view*). The photograph that I found later in the Garden City Collection nicely illustrates this point (see figure 9). So, why did, and do, I attach such importance to an obscure search result?

Young surfaced as a piece of information on the search results page displayed by Google Books in response to one of my queries – importantly, *not* a query directly pertaining to Young herself or even to her monograph *A Philosophy of Reality*. She surfaced in the thick of the non-exhaustive workings of a situated human–computer interaction, the workings of which interest me in this chapter on how metadata are active participants in processes of canonization and knowing today. How did the British philosopher Eva Louise Young—who died decades before the internet began to influence the philosophical profession—find me online seventy-seven years after her death? What does a provisional or perhaps *speculative* answer to this question reveal about the doing of research in the twenty-first century? Key to the discussion of how Young found me online is the question of what enabled her to do so—that is, under what operational logics and socio-technical conditions could this long-dead philosopher grab my attention for a forward citation in this chapter? I thus play with logics of "(un)findability"—here utilized conceptually for understanding search processes that are more

Fig. 9. LBM3056.43.47 – Digital copy of a photograph of Eva Young, her brother, and Lord Lytton. (Courtesy of Garden City Collections).

complex than those conducted linearly by a goal-oriented user of an online search platform.

Taking the everyday reality of scholars, educators, and students doing research online as its starting point, this chapter acknowledges that, in the "algorithmic condition" (Colman et al. 2018), the Internet is easily and frequently accessed via one's laptop, tablet, or mobile phone even while reading a paper copy of an article or a book. The internet, here, is the global and lively memory bank that we use for storing, accessing, and transmitting affects, data, information, and knowledge, both professionally and privately. Importantly, the internet is also used for the *building* of not only sets of affect icons, data warehouses, information systems, and knowledge centers, but also of the affective and data relations, pieces of information, and knowledge claims themselves. This chapter positions itself after the turn to artificial intelligence (AI) in our knowledge-producing endeavors as they are globally conceived and locally enacted. I unravel specifically how we, as humans today, produce knowledge through the screen and with so-called "metadata." I propose how to be critical of, but more importantly also creative with, the computational procedures that both impact us and—through our search and click behavior—in which we participate.

Metadata are data about other data, such as an author's name on the cover of a book or specific facts about the size and date of a digital file. This kind of data is always already part of a classificatory structure that

gives meaning to both the classes (name, size, date) and, through the structure itself, their contents. It is obvious that by naming, classifying, and managing classes XYZ and potentially ignoring classes ABC, the power to define and value are intrinsic to metadata practices (Acker 2021). In this chapter, I will argue that and show how metadata are curiously *active* in processes of knowing through data labeling, categorization, and prioritization. This machine-learning activity implies that we may also decide to be *creative* with the ongoing performance of metadata along with developing a critical stance on it. Adding metadata to the scan of a philosophical treatise, for instance, does not just make that treatise potentially findable online. The very processes of labeling, categorization, and prioritization are at once generative and restrictive of what can be brought forth in the algorithmic condition. Inclusion in and exclusion from a scholarly canon or some concrete knowledge claims (and not others) were not just brought forth by independently functioning machine-learning algorithms. Rather, they came about in interactions between non-human agents and human knowers via the screens of laptops, tablets, or mobile phones. This makes for a complex situation that cannot be easily understood or equivocally judged.

Today's knowledge is being produced not by humans alone but rather by humans, such as we ourselves, in a complicated relation of *entanglement* with non-human agents, such as the algorithms sourcing, using, and presenting metadata on online platforms. Humans and non-human agents today form an intricate "cognitive assemblage" with predictable, emergent, and surprising epistemic effects (Hayles 2017). One could say that the argument I am making about knowledge production in contemporary media-technological landscapes is a "posthuman" one (cf. Thylstrup 2018, 21). Some knowledges constructed through algorithm-driven platforms such as Google Books are exciting new opportunities for further research that extends social-constructivist "tool criticism" of the regulative and regulated nature of Google's search engine; this function is entwined with the user in what could perhaps be called "tool *creativity*," a perspective affirming that algorithmic functioning may at times be more playful than just predictive and predictively consensual.[2] In a situated human–computer interaction, a surprising find (a long-dead and forgotten female philosopher, for instance) may surface as the result of connecting metadata from the lively memory bank that is the internet. After this, a scholar *recognizing* the find

2 For tool criticism, see: Koolen et al. 2017 and van Es et al. 2021. For consensuality and Google's search engine, see: van Dijck 2010.

as potentially interesting does her research—again, often on Google— and thus in turn both user profiles and (potentially) the philosophical canon are affected.[3] Importantly, a "philosophical canon" is also a regulative and regulated device that needs both criticism and creative use in order for research to leap into the future.

Researching (in) the Algorithmic Condition

Researching a specific case of the performance of metadata is important in the light of present-day calls for "situated knowledges" (Haraway 1988) in the study of data use and computational machine learning. Why? Because when we as scholars and students refrain from reflecting on how our research objects appeared to us and ignore that, more often than not, this happens online, we are at risk of repeating exclusionary practices in terms of both the research itself (we should not ignore that our interest was raised in a media-technoscape) and in terms of who or what we cite as our academic and non-academic "influencers" or collaborators. Library and information scholar Anna Lauren Hoffmann argues that "the problem here isn't only one of biased datasets or unfair algorithms and of unintended consequences. It's also indicative of a more persistent problem of researchers actively reproducing ideas that damage vulnerable communities and reinforce current injustices" (in Crawford 2021, 117). In her book *Atlas of AI*, researcher of artificial intelligence Kate Crawford argues that the call for a responsible use of data and reliance on algorithms has a history that goes back to at least the 1970s with computer scientist Joseph Weizenbaum arguing against a techno-determinist perspective and in favor of an embodied (i.e., situated) perspective in his 1976 monograph *Computer Power and Human Reason: From Judgment to Calculation*:

> The lesson, therefore, is that the scientist and technologist must, by acts of will and of the imagination, actively strive to reduce such psychological distances, to counter the forces that tend to remove him [sic] from the consequences of his actions. He must – it is as simple as this – think of what he is actually doing. (as cited in Crawford 2021, 118)

Taking situatedness onboard, I will now ask what it means to do research in the algorithmic condition, thereby in fact researching this condition.

3 For recognizing surprise, see: Darbellay et al. 2014.

In today's world of networked ICTs and dynamic machine learning, the constitution of the researcher (the subject doing the knowing) and the researched (the object about which the scholar or the student is curious) has fundamentally shifted compared to the previous "postmodern condition" of stand-alone desktop computers and statically wired networks (Lyotard [1979] 1984). As researchers, we must now demonstrate a certain literacy around digital technology (Bühlmann et al. 2017; Erstad 2010; Johannesen et al. 2014; Koolen et al. 2019; van Dijck 2010) in order to function well, by which I mean that we must be able to use algorithm-driven platforms reflectively; we must also be critical toward the implied construction of truth and toward media technologies participating in knowledge production and in processes of in- and exclusion. We live in a time in which the thoroughly entangled nature of our human knowing with algorithmically driven search engines increasingly leads to situations that are characterized by ignorance, indifference, or the "user unconscious" (Clough 2018). Who are we as "posthumans" and in what kind of world do we live when this world, its objects, and our data-subjectivities come into being according to computational procedures that are generally invisible *and yet* have far-reaching epistemic effects?

As contemporary researchers making daily use of our laptops, tablets, and mobile phones, we edge our way through the dynamic archives that are consulted via the internet of algorithmic media. If we follow thinkers such as the French philosopher Michel Serres ([2012] 2015), then we become subjects in this world by engaging with/in such media. We become "Thumbelinas" or "Tom Thumbs" in the process of working with, and adding the power of definition and value to, pieces of information and click-worthy visuals. The algorithmic media themselves and the digital or digitized artifacts that emerge in such human–computer interaction are constituted as objects through networked acts. In our times, archives are still organized hierarchically—think of university libraries or Wikipedia—and they propagate familiar ways of structuring and representing knowledge. We must be critical toward this, as everything familiar is gendered, racialized, sexualized, etc. Yet by virtue of their "on-demand" nature, our online archives are also inclusive (albeit in a rudimentary form), and thus there is room for unexpected creativity. What I encounter online depends on the inputted query, my search history, the way in which I deal with issues of privacy, and the extent to which I allow the algorithms and computational procedures of the various platforms and search engines to access my searching behavior for user profiling. After all: "every swipe [is] a record in a database [...] [and] every choice we make is recorded"

(Witten and Frank 2005, 4). It is precisely for this reason that my search results differ from yours and that bias in, and responsible play with, truth and value are at stake.[4]

On Metadata Participating Algorithmically in the Research Apparatus

The future of Young's inclusion in the philosophical canon was—in media theorist Wendy Hui Kyong Chun's language of "programmability"—predicted and shaped based upon past data primarily through Google's tracking of my IP address's search terms. The service provided by American multinational tech company Google, i.e., Google Books, brought Young to me "through the data traces produced by [my] mappings" online (Chun 2011, 8). One could say that the interactive and ideological interfaces of Google "have been key to creating [the] 'informed' individual [here: Iris van der Tuin] who can overcome the chaos of global capitalism by mapping their relation to the totality of the global capitalist system" (8). However, speaking in an emancipative sense—and perhaps a little naively so—the rare event of attributing the book of metaphysics, *A Philosophy of Reality*, specifically to the female philosopher Eva Louise Young assured that, at the same time as corporate-run and market-driven interfacing takes place, "our computers execute in unforeseen ways, the future opens to the unexpected. Because of this, any programmed vision will always be inadequate, will always give way to another future" (9; cf. Gauthier 2016; Verhoeff and van der Tuin 2020). My naive enthusiasm about *the woman* E. L. Young can perhaps be traced to what has been described as the desire to be involved in change as the pleasurable fantasy that one is a "change agent" online: "we click, we change," summarizes Chun (2011, 69).[5] The desire to perhaps change the genealogy of posthumanism as a theoretical landscape (cf. Braidotti and Hlavajova 2018; Braidotti et al. 2022) by adding a yet unknown female philosopher to it could only happen by ignoring the machine reading and writing—the *computation*—that is invisibly performed in order for any user interface to function at all. This blindness creates the fiction of user control and authorship rather than acknowledging interpellation in human–computer

4 N. Katherine Hayles (2017, 32) argues that "the pockets within which technical systems operate autonomously are growing larger and more numerous." Among the examples of increasing autonomy that she gives are digital search engines.

5 Cf. Tara McPherson and Alexander Galloway in Chun 2011 (69, 205 n. 38).

interaction as involving all of the following: oppression, liberation, and diffraction.[6]

When stumbling upon Eva Louise Young's *A Philosophy of Reality*, published in 1930 by Manchester University Press, I thought: "Eva Louise Young?" Google Books' use of metadata from library and other databases provides her full given names, whereas the book itself portrays the author in a gender-neutral fashion as E. L. Young. The latter representation will have led to most book reviews of *A Philosophy of Reality*, published in the 1930s, representing Young as he/him/his (cf. de Beauvoir [1949] 2010). The early reception of *A Philosophy of Reality* was, to say the least, a heavily gendered process with reviewers questioning Young's rhetoric and style as soon as her femaleness was known to the reviewer. But rhetoric and style may very well have been consciously chosen, and her naming strategy may very well have been gender-aware! The point is that I would not have stumbled upon Young in October 2016 without the participation of Google's algorithm. I would have ignored E. L. Young's *A Philosophy of Reality* in a physical library or secondhand bookstore, as I was not looking for a book of metaphysics and because, as a scholar, I am not primarily interested in contributing to research about or in researching with male philosophers. Further, Young has not been canonized; information on Eva Louise Young is not readily available on the Internet or anywhere else. I really needed Google Books to "gender" E. L. Young and to "rank" the presentation of her work to me.

How Metadata Intervene in Processes of Knowledge Production

Google Books is the still-growing result of Google's book scanning activities at university libraries and academic publishers based mainly in the US, Europe, and Japan. Google Books, supported by Google as a larger company, Silicon Valley as an industrial area in California, and the internet globally, allows its users to search the full text of millions of publications that have been 3D-image scanned, converted to text using optical character recognition (OCR), and stored in their digital database. The outcomes of the digitization process for Google Books have been much debated by scholars and journalists alike for the initially low quality of its manuscript images, the poor functionality of OCR, and errors in the associated metadata (James and

6 Diffraction, here, stands for non-linear patterning, and oppression and liberation for predictable exclusive and inclusive linearities. For diffraction in both quantum physics and cultural inquiry, see Barad 2003 and 2007.

Weiss 2012, 16). Google Books is an archive that, as it is supported by Google in particular, is built on a logic of *feedback* (not just "access") between users, machines, and engineers and of controlling the informational *process* (not just the information itself) (Thylstrup 2018, 39). Google Books' descriptive metadata come from a variety of providers (41). As becomes clear in librarians Ryan James and Andrew Weiss's article "An Assessment of Google Books' Metadata," "[t]his process, presumably, involves using humans to generate the metadata" (James and Weiss 2012, 16). Should metadata be missing, however, Google guesses the necessary information for database-completion purposes (16).[7]

Debates about Google Books have mostly centered upon the negative impacts of errors on "the somewhat indeterminate concept of 'findability'" (19). This pertains to Google Books' practice of combining full-text searches with metadata that are affected—supposedly in approximately 37% of all items—by mechanical inaccuracies, not only typographic but also errors affecting meaning, such as misattributions. James and Weiss state: "We do not know the inner workings of the proprietary algorithms Google Books uses to order the search results list, but we can see that metadata are featured prominently on the search results list" (21). While this may very well be the case empirically speaking, I however must dare to disagree with the negative tone of the discussion (cf. Thylstrup 2018, 30, 37–38) given the way in which Eva Louise Young found *me* instead. The featured metadata "Eva Louise Young" generated a leap into the future of posthuman theory, as opposed to *A Philosophy of Reality* simply representing another potentially faulty search result, albeit one that was truthful to the past of a rare book publication.[8] What if we conceptualize findability not as uncertain or as vague, but as coming into being (*emerging*) in an "apparatus" in the sense of feminist science and technology studies scholars Katie King (in Haraway 1988, 595; 1994), Donna Haraway (1988), and Karen Barad (2007)? What if we try to both capture the moment—a Bergsonian "interval," as I will suggest below—of having been found by Eva Louise Young, retrospectively trace what happened in that timespan, and conceptualize the ingredients of the philosophical impetus of this moment's effect on the feminist genealogy of posthumanism?

7 I do not know how this is being done (by employees or algorithmically, or by a combination of both). See also Crawford (2021) on metadata not being the pinnacle of cleanliness (by decontextualization) but a more complex situation instead.

8 Results supposedly refer – from Latin *referre* "carry back," from *re-* "back" + *ferre* "bring" – to an original, flawless, non-digital publication.

Following a logic of authenticity, comparing Google Books' scanned cover of *A Philosophy of Reality* with the book's digital record in Harvard University Library's HOLLIS catalog seems to confirm that the 3D scanning of the book was initially performed in Cambridge, Massachusetts. HOLLIS's metadata—i.e., the book's WorldCat record and its MARC view—present the "E. L. Young" from the book's cover as Eva Louise Young, born in 1861. "MARC" stands for Machine Readable Cataloging, so it is likely that these data (among other data) were used by the Google Books algorithm to fill my ranked search results list in October 2016. But how do we move from the paradigm of spatiotemporally linear (un)findability to conceptualizing findability as generatively coming into being via an apparatus of canonization (here: philosophical) and knowledge production? How do we develop a method for retracing such emergence, "a method attuned to the entanglement of the apparatuses of production, one that enables genealogical analyses of how boundaries are produced rather than presuming sets of well-worn binaries in advance" (Barad 2007, 29–30)? For that, we must turn to the phenomenon of "nanopublication" and the concept and method of "quantum attribution." These practices stem from the field of bioinformatics, a field that equally grapples with data and information storage, labeling, and retrieval in dynamic settings and that may therefore help us be creative with tools.

On Affecting Canonization through Nanopublication and Quantum Attribution

In its most basic form, Google Books' descriptive metadata listed "*A Philosophy of Reality* by Eva Louise Young" in the left sidebar on my screen. This comes down to the assertion: "Eva Louise Young is the author of *A Philosophy of Reality*." This ostensibly insignificant fact has proven extremely meaningful, as at least one of its effects has been the research for this chapter, with another effect the creative addition—in the sense of French philosophers Gilles Deleuze and Claire Parnet's ([1977] 1987) "creative AND"—of E. L. Young to the feminist genealogy of posthumanism. It can be argued that the assertion of Eva Louise Young as the author of *A Philosophy of Reality* was published online only when I stumbled upon the scanned book while using Google Books. Such a simple, published assertion, dynamically generated in an instance of human–computer interaction, could be called a "nanopublication." The phenomenon of nanopublication, in the field of the history of philosophy, consists of publishing historical facts, philosophical facts, and connecting facts, with all such facts being of a simple nature and containing

a subject, a relation, and an object.[9] Here are some nanoassertions about Eva Louise Young and her monograph, *A Philosophy of Reality*:

– Historical fact: Eva Louise Young was a teacher, a gardener, an Esperantist, and the author of *A Philosophy of Reality*;
– Philosophical fact: Matter and mind are the public and private portions of one real, continuous, and comprehensible universe;
– Connecting fact: Eva Louise Young claims that things are what they seem.

These and other nanoassertions can be proven true or false by further research, so they are part of the positivist paradigm of spatiotemporally linear (un)findability. This is confirmed by the apparatus I have been using for these reflections: a website that facilitates nanopublication in the field of the history of early modern philosophy. Let me explain the positivist paradigm first and then move on to a paradigm that accommodates the dynamic non-linearity of the internet of algorithmic media.

The website *Early Modern Thought Online* (*EMTO*) *Nanopub* produces and stores a system of (cross)references to and from databases of libraries and archives linked to an individual researcher's name. The databases in this context comply with the hierarchical model—that is, they statically organize data into tree-like structures. In the vein of archival positivism, the philosophical apparatus of nanopublication would therefore produce descriptions that look something like this: "Iris van der Tuin has confirmed by way of the digitized *Pageant of Letchworth 1903–1914* by A. W. Brunt, first published in 1942 and now available through the website of The Letchworth Garden City Society, that Eva Louise Young was a teacher, a gardener, an Esperantist, and the author of *A Philosophy of Reality*."[10] Given that Young found me via the internet, it is paramount to abandon archival positivism—bound up as this epistemological stance is with the access paradigm of offline hierarchical archives—and to work instead toward a stance that can accommodate a logic of feedback and informational processing in an entangled apparatus of knowledge production. So, again: how to proceed?

The discussion about nanopublication as a phenomenon was, in fact, initiated in the field of bioinformatics under the interchangeable labels "microattribution," "precise citation," and "quantum attribution."[11] In this context,

9 http://emto-nanopub.referata.com/wiki/EMTO_Nanopub. See also http://nanopub.org/wordpress.

10 http://lgcs.org.uk/pageant/index.htm.

11 https://en.wikipedia.org/w/index.php?title=Microattribution.

the discussion exceeds spatiotemporal linearity given that bioinformatical data and information are always on the move. The concept and method of quantum attribution afford vertically static, horizontally dynamic, and transversally contingent acknowledgements of database entries and tagged archival records as situated scholarly contributions (cf. Verhoeff and van der Tuin 2020; van der Tuin forthcoming). In the words of communications and digital media scholar Nanna Bonde Thylstrup (2018, 22): today's knowledge is being produced online "where vertical hierarchies and horizontal networks entwine in a new political mesh" that she calls "networked assemblages." We must specify this statement given that the nanoscale—as the scale of quantum effects in both biology and in informational practices online—has afforded not only the nanopublication of specific entities and events that can be identified (DNA sequences, their variation, and their consequences [e.g., the spread of disease]) but also nanopublication of pure events such as DNA sequencing and (un)controlled genetic mutation (Patrinos et al. 2012). A cartographical "Janus face" thus emerges on this scale. On the one hand, the focus on genetic mutation and variation demonstrates how bioinformatics and therefore the method of quantum attribution are inescapably entangled with biopolitics and other racialized forms of population control. These practices need our critical response. On the other hand, correlational and causal relations do appear non-linearly as well, and they are important for the understanding and taking advantage of creativity in our research on the algorithmic condition (cf. Barad in Dolphijn and van der Tuin 2012, 55).

The bioinformatic nanoassertion, defined as "the smallest unit of publishable information that can be linked to its contributor via their unique scientific identity, and which can be cited and evaluated in terms of its impact upon the research community" (Patrinos et al. 2012, 1506), would first be stored in an open access database, and then a "microattribution analysis article" would "summarize the features of all variants at a particular locus, such as phenotypes, clinical findings, allele frequencies, and so on" (1506); all contributors of nanoassertions would thus be considered co-authors. To offer dynamic affordances, the bioinformaticians extend the simple subject-predicate-object structure of the good old positivist nanopublication to "include supporting information such as the nature of the data source, experimental conditions, and other contextual or 'credibility' features that the authors consider essential evidence for the assertion" (1506). Here we see that entanglement and, particularly, *movement* are accommodated in the data used and information provided—including sequence as well as sequencing, and index as well as indexing—and in the apparatus; stable links to obscure(d) data sources are exchanged for a method that facilitates data

mining and includes situated information about experimental conditions and context. Given that the neoliberal university and world-historical relations of race lurk behind the scenes of any bioinformatics project, it is a matter of research ethics to make explicit the situated apparatus in which (patented) DNA sequences came into being, are sequenced, and move around the globe, including how and where the sequencing happens (cf. Harvey 2016; Jamison 2016). Yet there is much to learn from bioinformatics for consideration and application in the fields of philosophy, media studies, and cultural inquiry alike, as they are being practiced in the algorithmic condition and take networked ICTs and dynamic machine learning as their starting points.

Lessons for Being Creative with Tools

It was the sudden appearance in Google Books of a datum (E. L. Young) as embodied (Eva Louise Young)—an effect of the behind-the-scenes quantum attribution of the book *A Philosophy of Reality* to the latter female philosopher—that produced the rare phenomenon of "posthuman interpellation" (cf. van der Tuin 2014) that halted me in my studies and initiated the unintended research for this chapter.

The diffraction that occurred amid my research with/in the internet in October 2016 caused Eva Louise Young to have perhaps always already been part of the feminist posthumanist genealogy. Now I understand the twenty-first century philosophical apparatus as simply hinting at the type of content, the underlying structure, and some of the affordances of media theorist Wolfgang Ernst's "dynarchive," in which what is archived remains mobile, as with the storage medium itself. Whereas here the "archive" stands for indirect/sequential access and the "anarchive" for direct/random access, Ernst (2014) opens to a transversal approach that is neither oppressive nor automatically liberating. In a dynarchive, there is a computational effect; past-based predictions about the future are made, and they take effect both in real-time and for future past-based predictions about the future (machine learning). And alongside the computational effect, in the words of Chun, "new media's modes of repetition and transmission [...] open up gaps for a future beyond predictions based on the past" (Chun 2011, 2).

This "opening-up" is that to which I previously alluded as the Bergsonian temporal interval. Reading the work of French philosopher Henri Bergson from his monograph *Time and Free Will: An Essay on the Immediate Data of Consciousness* ([1889] 1913) into Chun's words is not unsubstantiated, because Chun argues that in order to grasp "software's dynamic porousness

[it] is often conceptually transformed into well-defined layers. Software's temporality, in other words, is converted in part to spatiality, process in time conceived in terms of a process in space" (Chun 2011, 3). Theorist Stephen Crocker, author of *Bergson and the Metaphysics of Media*, says that "Bergson tries to surpass the simple opposition of discrete and continuous forms of organization to understand the medium in which they participate, which he calls "the Past in General" (Crocker 2013, 12).

This "past in general" inserts creative multiplicity into past-based predictions about the future, as the prediction *immediately* feeds back into the past and starts affecting predictions unfolding in real time.[12] The philosophical apparatus of which the appearance of "*A Philosophy of Reality* by Eva Louise Young" was part is temporal given that everything with regard to big data happens, in Chun's terms, "*in media res/race*," just as we have seen in the preceding discussion on the entanglement of quantum attribution and bioinformatics in our media-technoscape.

Conclusion

I have now researched my encounter with Eva Louise Young and the ways in which human–computer interaction intervened in the feminist genealogy and canonization process of posthumanism for about five years. By now I have given a few lectures (among others, an inaugural lecture at Utrecht University) in which Young has been put forward as part of that genealogy. I have brought the logics of (un)findability back to its fundamentals, which means I have understood, described, and analyzed the active role of metadata in that algorithmically driven and manually supported process, in which hardly anything is stable. Google Books has, in a successful and inimitable way, brought together metadata from all kinds of databases to finally come to the assertion that it was *Eva Louise* Young who wrote *A Philosophy of Reality* in 1930. The way in which Google Books operates must be understood in an interdisciplinary manner: the nanopublications from the history of philosophy should be supplemented with insights into micro-attributions,

12 Here, close affinities with Mark Hansen's recent work present themselves. Cf. the doubleness of twenty-first century media: "*at one and the same time*, twenty-first-century media *broker human access* to a domain of sensibility that has remained largely invisible (though certainly not inoperative) until now, *and*, it *adds to* this domain of sensibility since every individual act of access is itself a new datum of sensation that will expand the world incrementally but in a way that intensifies worldly sensibility" (Hansen 2015, 6; original emphasis).

precise citations, and quantum attributions from bioinformatics around a question that is central to the field of media studies.

What fascinates me is how online encounters produce facts in a process that cannot be described exhaustively, both because of its speed and because the description itself of the encounter is part of, and data for, that process. After all, we no longer write without Wi-Fi or 4- or 5G, and a click on *A Philosophy of Reality* immediately feeds the algorithm, thus adding weight to Google Books' unique record; this record is dynamically sourced from library and other metadata that are both authoritative and often erroneous. How do we handle such doubling of data? How do we apply "doubled vision," both programmed and human, to use ICT differently for a critical intervention in "the cycles of continuous reciprocal causality" so that we do more than passively respond to the pressures of accelerating information flow of which we are part (Hayles 2012, 102)?[13] How do we become aware of the fact that we, as technology users, media consumers, scholars, educators, and students, can potentially *benefit* from "[leaving] the potentialities open and [...] suggest[ing] alternative and more complex architectures of knowledge" (Pasquinelli 2018, 256)?[14] What posthuman, critical, and creative data-subjectivities ask of us is to position ourselves as digitally literate, because there is no escape from computational media-technologies. We will have to specify and mobilize that literacy by critically unpacking the operational logics and socio-technical conditions involved and by creatively jumping upon the surprises they bring forth, just as I have done in this chapter for one specific case.

References

Acker, Amelia. 2021. "Metadata." In *Uncertain Archives: Critical Keywords for Big Data*, edited by Nanna Bonde Thylstrup, Daniela Agostinho, Annie Ring, Catherine D'Ignazio, and Kristin Veel, 321–29. Cambridge, MA: MIT Press.

Barad, Karen. 2003. "Posthumanist Performativity: Toward an Understanding of How Matter Comes to Matter." *Signs: Journal of Women in Culture and Society* 28, no. 3: 801–31. https://doi.org/10.1086/345321.

13 I draw on a proposal by posthuman theorist of literature and new media N. Katherine Hayles (2012), and "doubled vision" was borrowed from the early feminist theorist Joan Kelly (1979).

14 As Pasquinelli quotes, after all: "With the temporality put to work by microprocessors, enormous quantities of data and problems can be processed in minuscule periods of time, in such a way that the new machinic subjectivities keep on jumping ahead of the challenges and stakes with which they are confronted" (Félix Guattari in Pasquinelli 2018, 256).

Barad, Karen. 2007. *Meeting the Universe Halfway: Quantum Physics and the Entanglement of Matter and Meaning*. Durham, NC: Duke University Press.

Bergson, Henri. [1889] 1913. *Time and Free Will: An Essay on the Immediate Data of Consciousness*. Translated by F.L. Pogson. 3rd ed. London: George Allen.

Braidotti, Rosi and Maria Hlavajova, eds. 2018. *Posthuman Glossary*. London: Bloomsbury Academic.

Braidotti, Rosi, Emily Jones and Goda Klumbyte, eds. 2022. *More Posthuman Glossary*. London: Bloomsbury Academic.

Bühlmann, Vera, Felicity Colman, and Iris van der Tuin. 2017. "New Materialisms, Novel Mentalities, Quantum Literacy." *the minnesota review* 88, no. 1: 47–58. https://doi.org/10.1215/00265667-3787378.

Chun, Wendy Hui Kyong. 2011. *Programmed Visions: Software and Memory*. Cambridge, MA: MIT Press.

Clough, Patricia Ticineto. 2018. *The User Unconscious: On Affect, Media, and Measure*. Minneapolis, MN: University of Minnesota Press.

Colman, Felicity, Vera Bühlmann, Aislinn O'Donnell, and Iris van der Tuin. 2018. *Ethics of Coding: A Report on the Algorithmic Condition* [*EoC*]. Brussels: European Commission. https://cordis.europa.eu/project/rcn/207025_en.html.

Crawford, Kate. 2021. *The Atlas of AI: Power, Politics, and the Planetary Costs of Artificial Intelligence*. New Haven, CT: Yale University Press.

Crocker, Stephen. 2013. *Bergson and the Metaphysics of Media*. London: Palgrave Macmillan.

Darbellay, Frédéric, Zoe Moody, Ayuko Sedooka, and Gabriela Steffen. 2014. "Interdisciplinary Research Boosted by Serendipity." *Creativity Research Journal* 26, no. 1: 1–10. https://doi.org/10.1080/10400419.2014.873653.

De Beauvoir, Simone. [1949] 2010. *The Second Sex*. Translated by Constance Borde and Sheila Malovany-Chevallier. New York: Alfred A. Knopf.

Deleuze, Gilles, and Claire Parnet. [1977] 1987. *Dialogues*. Translated by Hugh Tomlinson and Barbara Habberjam. London: The Athlone Press.

Dolphijn, Rick, and Iris van der Tuin. 2012. *New Materialism: Interviews and Cartographies*. Ann Arbor, MI: Open Humanities Press.

Ernst, Wolfgang. 2014. "Between the Archive and the Anarchivable." *Mnemoscape* 1. https://www.mnemoscape.org/single-post/2014/09/04/Between-the-Archive-and-the-Anarchivable-by-Wolfgang-Ernst.

Erstad, Ola. 2010. "Educating the Digital Generation: Exploring Medial Literacy for the 21st Century." *Nordic Journal of Digital Literacy* 5, no. 1: 56–72. https://doi.org/10.18261/ISSN1891-943X-2015-Jubileumsnummer-07.

Gauthier, David. 2016. "On Commands and Executions: Tyrants, Spectres and Vagabonds." In *Executing Practices*, edited by Helen Pritchard, Eric Snodgrass, and Magda Tyżlik-Carver, 63–76. Brooklyn, NY: Autonomedia.

Hansen, Mark B. N. 2015. *Feed-Forward: On the Future of Twenty-First-Century Media.* Chicago: University of Chicago Press.

Haraway, Donna J. 1988. "Situated Knowledges: *The Science Question in Feminism* and the Privilege of Partial Perspective." *Feminist Studies* 14, no. 3: 575–99. https://doi.org/10.2307/3178066.

Harvey, Sandra. 2016. "The HeLa Bomb and the Science of Unveiling." *Catalyst: Feminism, Theory, and Technoscience* 2, no. 2. https://doi.org/10.28968/cftt.v2i2.28803.

Hayles, N. Katherine. 2012. *How We Think: Digital Media and Contemporary Technogenesis*. Chicago: University of Chicago Press.

Hayles, N. Katherine. 2017. *Unthought: The Power of the Cognitive Nonconscious*. Chicago: University of Chicago Press.

James, Ryan, and Andrew Weiss. 2012. "An Assessment of Google Books' Metadata." *Journal of Library Metadata* 12, no. 1: 15–22. https://doi.org/10.1080/19386389.2012.652566.

Jamison, Matthew. 2016. "Becoming-HeLa: Towards an Ethico-Onto-Epistemology of Grief." Unpublished MA thesis, Utrecht University.

Johannesen, Monica, Tonje Hilde Giæver, and Leikny Øgrim. 2014. "Notion in Motion: Teachers' Digital Competence." *Nordic Journal of Digital Literacy* 9, no. 4: 300–12. https://doi.org/10.18261/ISSN1891-943X-2014-04-05.

Kelly, Joan. 1979. "The Doubled Vision of Feminist Theory: A Postscript to the 'Women and Power' Conference." *Feminist Studies* 5, no. 1: 216–27. https://doi.org/10.2307/3177556.

King, Katie. 1994. *Theory in its Feminist Travels: Conversations in U.S. Women's Movements*. Bloomington, IN: Indiana University Press.

Koolen, Marijn, Jasmijn Van Gorp, and Jacco van Ossenbruggen. 2019. "Toward a Model for Digital Tool Criticism: Reflection as Integrative Practice." *Digital Scholarship in the Humanities* 34, no. 2: 368–85. https://doi.org/10.1093/llc/fqy048.

Lyotard, Jean-François. [1979] 1984. *The Postmodern Condition: A Report on Knowledge*. Translated by Geoff Bennington and Brian Massumi. Manchester: Manchester University Press.

Pasquinelli, Matteo. 2018. "Metadata Society." In *The Posthuman Glossary*, edited by Rosi Braidotti en Maria Hlavajova, 253–56. London: Bloomsbury Academic.

Patrinos, George P., David N. Cooper, Erik van Mulligen, Vassiliki Gkantouna, Giannis Tzimas, Zuotian Tatum, Erik Schultes, Marco Roos, and Barend Mons. 2012. "Microattribution and Nanopublication as Means to Incentivize the Placement of Human Genome Variation Data into the Public Domain." *Human Mutation* 33, no. 11: 1503–12. https://doi.org/10.1002/humu.22144.

Serres, Michel. [2012] 2015. *Thumbelina: The Culture and Technology of Millennials*. Translated by Daniel W. Smith. London: Rowman and Littlefield International.

Thylstrup, Nanna Bonde. 2018. *The Politics of Mass Digitization*. Cambridge, MA: MIT Press.

van der Tuin, Iris. 2014. "Diffraction as a Methodology for Feminist Onto-Epistemology: On Encountering Chantal Chawaf and Posthuman Interpellation." *Parallax* 20, no. 3: 231–44. https://doi.org/10.1080/13534645.2014.927631.

van der Tuin, Iris. 2018. "Vindingrijk: Kritiek en creativiteit in cultuurwetenschappelijk onderzoek" [Resourceful: Critique and Creativity in Cultural Inquiry]. Inaugural Lecture, Utrecht University. http://issuu.com/humanitiesuu/docs/inaugural-lecture-iris-van-der-tuin?e=11895952/66165689.

van der Tuin, Iris. Forthcoming. "The Triple Mechanics of Susanne K. Langer's Card-Index System: Horizontal, Vertical, and Transversal Aspects." In *The Bloomsbury Handbook of Susanne K. Langer*, edited by Lona Gaikis. London: Bloomsbury Academic.

van Dijck, José. 2010. "Search Engines and the Production of Academic Knowledge." *International Journal of Cultural Studies* 13, no. 6: 574–92. https://doi.org/10.1177/1367877910376582

van Es, Karin, Mirko Tobias Schäfer, and Maranke Wieringa. 2021. "Tool Criticism and the Computational Turn: A 'Methodological Moment' in Media and Communication Studies." *M&K. Medien und Kommunikationswissenschaft* 64, no. 1: 46–64. https://doi.org/10.5771/1615-634X-2021-1.

Verhoeff, Nanna, and Iris van der Tuin. 2020. "Interfaces (for) Diffracting Technobodies: A Science-Humanities-Design Perspective for an Algorithmic Somatechnics." *Somatechnics: Journal of Bodies – Technologies – Power* 10, no. 3: 374–96. https://doi.org/10.3366/soma.2020.0328.

Witten, Ian H., Eibe Frank. 2005. *Data Mining: Practical Machine Learning Tools and Techniques*. 2nd ed. Amsterdam: Elsevier.

Young, E. L. 1930. *A Philosophy of Reality*. Manchester: Manchester University Press.

About the Author

Iris van der Tuin is Professor of Theory of Cultural Inquiry in the Department of Philosophy and Religious Studies at Utrecht University, where she is also university-wide Dean for Interdisciplinary Education. Her research is part of the group "Transmission in Motion" of the Institute for Cultural Inquiry.
> i.vandertuin@uu.nl