Autoethnographies of Mediation

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Humanities research with computing is frequently associated with three approaches to technologies: building infrastructure, designing tools, and developing techniques. The infrastructural approach is common among some libraries and labs, for example, where "infrastructure" implies not only equipment, platforms, and collections but also where and how they are housed and supported (Canada Foundation for Innovation 2008, 7). Tools, meanwhile, are usually designed and crafted with infrastructure. They turn "this" into "that": from input to output, data to visualization, source code to browser content (Fuller 2005, 85). Techniques are then partly automated by tools. Aspects of a given process performed manually may become a procedure run by machines (Hayles 2010; Chun 2014). Although these three approaches are important to humanities computing, today they face numerous challenges, which are likely all too familiar to readers of this handbook.

Among those challenges is technical expertise. Undergraduate and graduate students as well as humanities staff and faculty are rarely trained in areas such as computer programming and artificial intelligence (AI). Developing this expertise is no small task, especially when it is combined with academic studies of history, culture, language, or literature. Software appears in the meantime to grow and obsolesce rapidly. Just as someone finally learns the ins and outs of a platform, they may be asked—or required—to switch to another one. Computing in the humanities thus brings with it various justifiable concerns, if not anxieties, about the perceived obligation to "keep up" with the pace of the (mostly privatized) technology sector (Fitzpatrick 2012). Alongside this obligation comes the related challenge of maintenance. Infrastructure and tools demand routine attention, even when platforms are automagically updated. Maintenance is expensive, too. If researchers are fortunate to acquire grant funding to build infrastructure or design a tool, then they must also consider the near future of their projects. What will be the state of this humanities platform in ten years? Who will be using it, what will they want or need, who will steward it from here to there, and at what cost? Such issues are labyrinthine in that their trajectories are incredibly difficult to predict. They are also complex from the labor perspective, where precarity is now the default state for academics who are increasingly spread thin yet expected to do more and more with less and less.

As we confront these challenges—one of us (Julie) a PhD student in science and technology studies, and the other (Jentery) an associate professor of English—we are experimenting with another approach to computing in the humanities, namely autoethnography, which is by no means new to the academy. Carolyn Ellis and Arthur P. Bochner provide a capacious but compelling definition of autoethnography, and we adopt it for the purposes of this chapter: "an autobiographical genre of writing and research that displays multiple layers of consciousness, connecting the personal to the

cultural" (2000, 739). Our only edit is minor: "multiple layers of *mediation and* consciousness." For us, adding mediation to the mix of autoethnography is one way to engage computing (in particular) and technologies (in general) as *relations*. This means tools and infrastructures are more like negotiations than objects or products, and techniques are processes at once embodied (personal) and shared by groups and communities (cultural).

We, like Ellis and Bochner, also embrace writing as an autoethnographic method, in our case to address epistemological and phenomenological questions that arise from the practice of computing (Ramalho-de-Oliveira 2020, 7127). Such questions include, "What is the relationship between the production of data and the creation of stories?" "How are we to understand agency in situations where both people and machines contribute to acts of writing, perception, and expression?" And, "How are people and their experiences rendered discrete and measurable, or indistinct, invisible, and immeasurable, through their engagements with computing?" Writing as an autoethnographic method thus involves description, documentation, and address—writing about, writing down, writing to—as well as representation, traversal, and resistance, if not refusal—writing for, writing through, writing against, not writing back. Equally important, autoethnographic writing is not some one-size-fits-all solution to all the challenges facing computing. It is rather another angle on computing as a problem warranting approaches from multiple perspectives in the humanities. With these problems in mind, autoethnography can be used to foment and perturb persistent challenges. What we call "autoethnographies of mediation" in this chapter ultimately aim to spark conversations with other approaches to computing and, we hope, integrate with them.

Since this chapter appears in a handbook on the possible trajectories of humanities research with digital technologies, we want to be especially clear about what an autoethnography of mediation may privilege in that context:

- Prototyping content with existing platforms instead of building and maintaining the platforms themselves (Sayers 2015).
- Design as a line of inquiry rather than a feature or trait of a tool (Rosner 2018).
- The settings and lived conditions of particular uses (or "use cases") over the generalized distribution and effects of a computing technique or tool (Botero 2013; Losh and Wernimont 2019).
- Writing stories with, through, and against computing from first-person perspectives.
- A subject's embodied experiences with technologies, or a refusal to evacuate the subject from computing and infrastructure projects.

Readers will likely observe that our list aligns itself with the ostensible positions of users, consumers, fans, hobbyists, tinkerers, and even quality assurance testers. Our intent is not to romanticize or even prioritize such positions; it is to underscore the fundamental roles they and their stories play in everyday computing throughout the production loop, if you will: from design and development to distribution, consumption, content delivery, and maintenance. Put this way, autoethnographies of mediation are not reactionary exercises even if they are, as we mean to demonstrate, invested in changing computing cultures through stories and prototypes (Stone 2001).

To elaborate, we share an example in the following section from Julie's research in biometrics, which is one of the most pressing areas for computing research today (Browne 2015; Murphy 2017; Wernimont 2019). As an autoethnography of mediation, our example is admittedly an outlier in this handbook. It is grounded in personal, subjective experience, but that decision is purposeful, and truly

necessary, for the autoethnography at hand. Julie traces their complicated engagement with a fertility tracker through various, deeply embodied forms of writing and prototyping back, to, and about the biometric device. After our example, we conclude the chapter by outlining potential trajectories for autoethnographies of mediation at the intersections of computing, technologies, and the humanities, including how autoethnography might feed-forward into techniques, tools, and infrastructures.

N(O)VUM ORGANUM

LH: 0.00 IU/L	Level: None	Jul. 7, 2019

An organ is an instrument. A speculum is an instrument. A teched-out cocktail stirrer in a small jar of piss is an instrument. Ten milligrams of medroxyprogesterone is an instrument. Data is an instrument. An organ is an instrument.

N(o)vum Organum (pronounced "no ovum organum") is an interactive autoethnography that examines the process of subject-making when empirical tools are turned back onto the body. I (Julie) intend it as a response to biometric tracking devices and the positivist empirical approach they take to measuring and essentializing the body; an epistemological precept that can be traced back to Francis Bacon's writings in his *Novum Organum*.[1] Bacon's text is complex, equally inspiring and infuriating, and I care deeply about how Bacon uses instrumentation to position quantification as a technique for uncovering those pesky matters of fact about bodies, any body, my body. This position presumes that only that which can be discerned through measurement can be truly known. Bacon's epistemological legacy is, of course, a familiar and persistent one, and its angle on instrumentation is alive and well in today's market of personal biometric devices. My project in *N(o)vum Organum* is to challenge how these biometric devices not only measure for "normalcy" but also use their metrics to render a subject "real" or recognizable through quantification. The result is a story of embodied interaction that resists such grand narratives. These moments of resistance are meaningful as they insist that there are other ways to constitute embodiment through data, ways that biometric devices either do not or cannot represent.

Over the summer of 2019, I tracked my luteinizing hormone (LH) levels with the AI-enabled Mira fertility tracker. The results were underwhelming as I often measured LH concentrations in a range labeled "NONE" (0–4.72 IU/L) or, on an especially exciting day, I reached the low end of "LOW" (4.73–14.35 IU/L). Despite the banality of measurement, every three days I diligently peed into a small glass jar, used a new Mira "wand" as a cocktail stirrer for ten seconds, replaced the cap over the wet end of the plastic stick, and inserted the wand into the handheld egg-shaped computer while I waited for Mira to report back my hormonal deficiencies. No ovulation prediction was ever sent to my phone because I don't ovulate. A five-millimeter adenoma in my pituitary gland disrupts the typical endocrine cascades that eventually produce the sorts of steroid hormones, such as the estrogens and LH, that get monitored in reproductive health. This data, or lack thereof, became my basis for telling the story of "no ovum organum."

The story is told through thirty digital pages in a display built in Java-based Processing 3. One can move through the pages with the reprogrammed Mira. When any of the thirty wands originally used to measure my LH levels are inserted into the jailbroken Mira, the bottom tip of the wand lights up (Figure 10.1) and the story page corresponding to the day that wand was originally used appears on an adjacent computer screen (Figure 10.2). Centering my pathologized hormonal

FIGURE 10.1 Reconfigured wands are inserted into a hacked Mira device to control the story on an adjacent computer screen. The screen also displays data, including the date of the original LH measurement, the concentration level, and a running graph scaled to "typical" LH fluctuations over a thirty-day cycle. Credit: Julie M. Funk.

FIGURE 10.2 Screen capture from July 25, 2019, the ninth day of measurement, shows the interface design. Credit: Julie M. Funk.

story across a temporal organization that was designed to favor metrics and trends becomes an act of resistance against a biometric device's Baconian tendencies to view measurement as the epistemological end of embodiment. My critical interpretation in this response to Bacon's *Novum Organum* unfolds through an alteration of a primary source. *N(o)vum Organum* invokes Bacon's text, quoting directly from it on the second day of the story, only to respond on the twenty-second day by revising Bacon's separation of mind and body and his reliance on "mechanical aid."

Second day of measurement:

LH: 4.08 IU/L	Level: None	Jul. 4, 2019

"Our only remaining hope and salvation is to begin the whole labour of the mind again; not leaving it to itself, but directing it perpetually from the very first, and attaining our end as it were by mechanical aid." –Francis Bacon

Twenty-second day of measurement:

LH: 0.00 IU/L	Level: None	Sep. 2, 2019

*"Our only remaining hope and salvation is to begin the **networked** labour of **embodiment** again; not leaving **mind and flesh** to **themselves**, but **embracing new relations** perpetually from the very first, and **resisting boundaries** as it were **despite and alongside** mechanical aid."*

Engaging in *N(o)vum Organum* as an autoethnography of mediation does not eschew the value of tools and techniques; on the contrary, such technologies are essential to my inquiry, as this commentary on autoethnographic mediations aims to unfold. However, my inquiry into the mediating relations concerning epistemologies of the body and through the body, rather than the surveilling instrument, left me critical of the biometric propensity to over-qualify quantification and under-quantify the qualification of the subject and their situatedness. Committing to autoethnographic practices in our research about *and* with media foregrounds how media are always embodied experiences in the making.

Initially, I imagined *N(o)vum Organum* as a way to theorize how biometrics collapse boundaries between quantification and qualification, empirical evidence and embodied experience, data and representation. Thinking through processes of mediation and their contexts sheds light on ways to reclaim stories of embodiment by blurring established dichotomies in epistemological practices that privilege knowledge by way of measurement. By writing against these Baconian ideals, *N(o)vum Organum* shifts the emphasis away from "attaining [an] end [through] mechanical aid" and towards the ways critical investigations of mediation can help us to challenge the neat and clear-cut boundaries often produced by treating metrics as ends.

Given its investment in the relationship between mediation and embodied experience as a form of inquiry, *N(o)vum Organum* is an autoethnography with a prototype. Unlike many tools designed for humanities research, I designed this physical computing project to be non-scalable and ephemeral.[2] This choice allowed me to embrace the specters of time and maintenance ever-present in the project. While the development of tools and infrastructures is of course important for humanities research, autoethnographies with technologies can and should be written, too. They can be communicated through text, images, videos, and audio and published by open access venues to encourage conversation among community members. They act as prompts for experimental and evocative ways of thinking, and for talking about research as a relationship that need not result

in an object to be used (a product for circulation) or a process to be imitated (also a product for circulation) (Funk et al. 2021). Consider a few examples from *N(o)vum Organum*, where the mediated and mediating experiences of hormones are central to a critique of biometrics.

LH: 3.72 IU/L	Level: None	Sept. 18, 2019

This is an open system. Endocrinology becomes exocrinology.

People involved in physical computing projects like *N(o)vum Organum* know those projects often become collections of e-waste once the laborious feedback loop of research-creation exhausts itself. With temporality in mind, I tried to salvage as much as possible from Mira's original hardware to not only practice more responsible research but also invert a common workflow, turning a potential object into reusable parts rather than instrumentalizing a process toward a product. I became distinctly aware of Mira's components, their limitations, and their capacities to persuade, engage, and aid me in telling my story. Interactions with Mira are mediated in numerous, if not countless, ways. Its app, for example, sends data back and forth to various servers and handheld devices. Information about LH concentrations must be determined by a small internal sensor that measures the color of ovulation test strips (the kind you can get at a drugstore), turning qualitative, analog information into quantitative, discrete data. Before this process even unfolds, the ovulation test strips in the wands are biochemically mediated by hormone concentrations carried in my urine.

These various forms of mediation persist in *N(o)vum Organum* and inform how I designed the project and experienced it with others as an open system. The almost ritualistic act of inserting those wands into the egg-shaped handheld device became the controller used to move through all thirty parts of the story. The wands are part of a feedback loop that sends data across programming languages (C++ to Python to Java), devices (Mira to MacBook), and bodies (mine to yours to someone else's). The Mira I incorporated into *N(o)vum Organum* is no longer Mira the consumer commodity, this particular unit having reached its own limitations as a commercial product. Yet the device's propensity for representing a subject *here* and *now* through biometrics endures in the perceived immediacy of this data. This phenomenon echoes what Jay David Bolter and Richard Grusin identify as the double logic of immediacy, which "dictates that the medium itself should disappear and leave us in the presence of the thing represented" (Bolter and Grusin 2001, 5–6). The immediacy of biometric reporting in the *N(o)vum Organum* interface (wand in = numbers and words on a screen) reproduces the same sort of immediacy present in Mira's subject-making power.

Mira is both present and not present in the story *N(o)vum Organum* tells. While much of the original hardware and branding remain intact, the device is no longer able to measure LH concentrations from the ovulation test strips in the wands. When a used wand is inserted into the Mira-made-controller, the corresponding display nevertheless shows temporal (date) and biochemical (LH concentration) data. It's as if *N(o)vum Organum* is measuring the LH in that moment of insertion. The immediacy of the data represented on the display seems to indicate as much, but it is always pointing back to thirty specific moments in the summer of 2019. The immediacy of the data also seems to suggest that it is situated in the interface. The interface is, after all, presumably where we experience the best representation of my embodiment. Yet, in my thinking on the project I've found myself asking, if the material information can be traced somewhere outside my body, wouldn't it be in the wands? Not the wands at the time of this reflection, when all the water in the LH-carrying urine has long since evaporated and the LH molecules have broken down

within a day of leaving my body, but the wands in 2019, when the built-in ovulation test strips first captured those scarce amounts of hormones. The material and embodied complexity of this process is precisely why *N(o)vum Organum* needed to be an autoethnography; it is a mediating collection of ephemeral data, persistent inscription, and lived experience.

LH: 0.00 IU/L	Level: None	Sept. 27, 2019

All hormones are reproductive hormones; generative and vital.

Addressing these various forms of mediation and the problems they present returns me to my original line of inquiry: When do biometrics undergo boundary collapse between quantification and qualification, empirical evidence and embodied experience, and data and representation? Hormones are already indexed as media by natural science and medical resources, both in expert and popular discourses. They are described as chemical *messengers* operating in feedback loops of signals and dependent on specific conditions for reception before the body can increase, decrease, or transform and cascade the biochemical structures of certain hormones into other ones, in other concentrations. When devices such as Mira leverage the mediated experience of hormones in their design, they are not merely relying on predetermined biometrics obscured within the body; they are *creating* biometrics through intricate processes of remediation and quantification. Additionally, Mira produces subjects by converting embodied experiences into measurable representations conducive to tracking. In my case, Mira represented my atypicality and pathology (clinically speaking) as a biological issue incompatible with its design; before I refused Mira, it refused me.

N(o)vum Organum helps me bring my biochemistry outside of Mira's empirical framework and into a story that attempts to communicate embodiment through attention to context and messy, ever-changing representations unfolding in the present. As an autoethnography of mediation, and of biometrics in particular, my reflections on *N(o)vum Organum* are an attempt at repositioning my subjectivity in relation to media I'm working with. By attending to such processes of mediation as part of computing research, we might better engage with biometrics (or other forms of data) and the devices that produce them as sites of conflict and entanglement.

SOME POSSIBLE TRAJECTORIES

Zooming out from *N(o)vum Organum*, we conclude this chapter by outlining some possible trajectories for autoethnographies of mediation in the context of computing and the humanities. We first return to those three common approaches to technologies. How might autoethnographies of mediation feed-forward into the design and development of techniques, tools, and infrastructures?

By treating writing as a method for traversing the processes of computing, autoethnographies of mediation keep technologies visible as processes and points of discussion (Moulthrop and Grigar 2017). Although computing techniques typically run in the background and, by extension, enable everyday computing habits, they can also be subjects of study, prompting autoethnographers to treat them more like verbs and actions than nouns or things. Attention to mediation also highlights moments when practitioners may want to avoid automating certain procedures or decisions, or may wish to slow down technological development to consider the assumptions baked into programming and AI. Which computing assumptions may cause harm when automated or habituated? Which features should be "undone" prior to release rather than after it?

True, an autoethnography of mediation may at times feel or sound like a quality assurance test. Does the device work? What do we observe when we document our use of it over time? But the writing and prototyping do not end with identifying bugs to be fixed or solved. They instead enrich existing technical issues by grounding them in culture. The question of whether a device works becomes a question of how it affects and accounts for individuals and their communities. The labor of documenting use becomes a means of storytelling, which may also be informed by histories of media technology, such as *N(o)vum Organum*'s alteration of Bacon's oft-cited work. And perhaps most crucial, the rhetoric and perception of bugs may be expanded to account for norms, like the representation of hormonal atypicality as a biological issue. What is the tool at hand presumably extracting? What types of subjects does it mean to produce? How and to what effects does it establish or perpetuate potentially damaging, alienating, or misleading standards of measurement? (Bowker and Star 2008).

Autoethnographies of mediation help people to better grasp the complex relations between the personal and the cultural in the context of Technology and technologies, if you will. In the case of *N(o)vum Organum*, that Technology is biometrics: the open system of computing that not only connects but also reproduces a wide array of individual technologies that mediate people's relations with their own bodies. Prototyping through and against such metrics bridges the capital "T" with its lower case while encouraging practitioners to account for the infrastructures, perhaps easily ignored or overlooked, with which their projects are or may be complicit (Parks and Starosielski 2015). Autoethnography nudges people to consider these issues early in the design and development process. Which infrastructures can simply be adopted or adapted? When is a new or alternative one necessary for the line of inquiry at hand? What might practitioners learn, or what stories might they hear, while producing content with an infrastructure over time? We could even argue that infrastructural approaches are meaningless without the stuff and experiences of the stories they afford.

We might also recall several challenges facing humanities computing projects. While autoethnography will not, and should not, aim to resolve these challenges, it may play a key role in addressing or navigating them. First, autoethnographies of mediation acknowledge and embrace the expertise of users and audiences, who know their wants, needs, and experiences better than industry, regardless of whether they are computer programmers or AI experts. Readers will of course observe that *N(o)vum Organum* involves some degree of technical intervention: Julie's use of Processing 3, for instance, or the act of jailbreaking Mira. Yet the engagement itself, including the writing process, is cultural in the last instance. A Mira user does not need to know Java to identify the assumptions it makes about hormones and LH concentrations. Better yet, critiques of computing and technology are often most compelling when expressed from the "outside," by people who were not involved in, for example, Mira's funding, design, and development. Autoethnographies remind practitioners how informative such critiques are and why they should not be relegated to the comments box on a company's website.[3]

Meanwhile, everyone involved does not need to know how to program or train machines to turn this into that. In fact, computing projects need contributors who do not identify (or care to identify) with such expertise. Despite the individualizing "auto" in autoethnography, this method can, and we believe should, be a method of collaboration and co-production that includes care as a form of collaborative support (Bailey 2015). In the case of *N(o)vum Organum*, Julie received technical support during particularly challenging aspects of development, not to mention

the collaboration in this chapter's reflections on autoethnographies of mediation. Much can be achieved via collaboration across diverging forms and domains of research practice, or via attention to "non-expert" experiences of designed immediacy that do not assume any technical knowledge.

From content moderation and crowdsourcing to routine bug fixes and software updates, a significant amount of computing maintenance is done precariously, if not voluntarily and without compensation. Autoethnographies of mediation foreground such maintenance through storytelling, highlighting not only the particulars of use and repurposing but also the material resources and labor required to keep the machine running (Allen and Piercy 2005; Ettorre 2019). In *N(o)vum Organum*, these resources and labor include not only the financial costs associated with prototyping, such as the $300 Mira device, but also the time and emotional labor spent writing longitudinal stories and repeatedly confronting Mira's reproduction of dysfunction and biometric invisibility. Though these costs proved to be challenging to the research, they were often one-time investments, with the exception of labor and maintenance. When integrated into computing projects, autoethnographies may help to reduce scope and feature creep—to "degrow" the reach of the digital—and in turn underscore the conditions a project requires and makes possible. Will the project rely on crunch, temporary contracts, or unpaid overtime to meet a release deadline? Will it also rely on voluntary feedback and user data for improvement over time? Which aspects of the project could be cut or minimized to better support the working and living conditions of its contributors?

We encourage provocation in humanities computing with these trajectories in mind. We offer autoethnographies of mediation not as a solution but as an approach to responsible, self-conscious inquiry that foregrounds our complex relations to time, scale, scope, and labor whenever we work with computers.

ACKNOWLEDGMENTS

NOTES

1. This project relies on the English translation of Bacon's work, but does leverage the text's Latin title for critical commentary on fertility tracking in *N(o)vum Organum*. See Bacon (1902).
2. An in-browser version of *N(o)vum Organum*, made with the open-source storytelling tool Twine and hosted on Itch.io, can be found at http://www.juliemfunk.com/projects/novum-organum. This version remains susceptible to the issues of maintenance and obsolescence addressed in this chapter.
3. Other pertinent examples of such critiques may be found in fan fiction, game mods, and cosplay and roleplay communities.

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