

98.6:

FEVERS, FERTILITY, AND THE  
PATIENT LABOR OF AMERICAN MEDICINE

Deanna Day

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Supervisor of Dissertation:

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Robert Aronowitz  
Professor, History and Sociology of Science

Graduate Group Chairperson:

---

John Tresch, Associate Professor, History and Sociology of Science

Dissertation Committee:

Robert Aronowitz, Professor of History and Sociology of Science  
John Tresch, Associate Professor of History and Sociology of Science  
Nathan Ensmenger, Associate Professor in the School of Informatics and Computing,  
Indiana University

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MEDICINE

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Deanna Marie Day



*For Peter,  
who helps me be me*

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## **Abstract**

### 98.6: FEVERS, FERTILITY AND THE PATIENT LABOR OF AMERICAN MEDICINE

Deanna Day

Robert Aronowitz

My dissertation uses the history of the consumer medical thermometer to uncover a previously unexamined history of patient labor, showing how American women have been enrolled in the process of performing technological medical work with profound epistemological and political consequences. Despite the rhetoric of the patient as consumer that has pervaded popular and scholarly discourse in the twentieth century, my principal actors — women who use temperature tracking to care for their children and to chart their fertility — engaged in rigorous medical work. I explore how women have contributed to scientific discoveries surrounding ovulation, how they integrated nineteenth-century ideas of environmental health and the body with modern scientific notions, and how their labor has refashioned their subjectivity. Through doing this work, female temperature trackers have accepted responsibility for a particular kind of regimented and predictable bodily functioning, as well as blame for its failure. In so doing, they have prefigured a mode of neoliberal bodily management that is coming to define medical care in the early twenty-first century.



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## Power, by Adrienne Rich

Living in the earth-deposits of our history

Today a backhoe divulged out of a crumbling flank of earth  
one bottle amber perfect a hundred-year-old  
cure for fever or melancholy a tonic  
for living on this earth in the winters of this climate

Today I was reading about Marie Curie:  
she must have known she suffered from radiation sickness  
her body bombarded for years by the element  
she had purified  
It seems she denied to the end  
the source of the cataracts on her eyes  
the cracked and suppurating skin of her finger-ends  
till she could no longer hold a test-tube or a pencil

She died a famous woman denying  
her wounds  
denying  
her wounds came from the same source as her power

1974

*The Dream of a Common Language, Poems 1974-1977*

## Introduction

### Making the Thermometer Strange

In 1874, a doctor presented a necrometer to the Paris Academy of Medicine. (His name has been omitted from the reports.) Such a mechanism—which could determine whether a body was living or dead—was in high demand at the turn of the century. A literary tradition that includes Edgar Allan Poe stories such as “The Cask of Amontillado” as well as new medical advancements like artificial respiration contributed to popular anxieties about the nature of death: How can we be sure that a body that looks dead actually is dead? (This dilemma was also the origin of the safety coffin and many other technologies for those afraid of being buried alive.) The necrometer, with its quantitative scale of relative “vitality,” purported to answer this question.

The device presented in Paris in 1874, though, was a parody—it was nothing more than a fever thermometer with an altered scale. The “point of health”—what is known today as the standard 98.6 degrees Fahrenheit—was mislabeled as 0, the indicator of death. Several of those in attendance were “diagnosed” as deceased.<sup>1</sup>

The stunt needled physician Édouard Séguin, who believed deeply in the thermometer’s power both as a necrometer and as a general health care tool that could be used by lay people as well as by elite physicians. The French-born Séguin, who moved to

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<sup>1</sup> Édouard Séguin, *Medical Thermometry and Human Temperature* (New York: W. Wood & Company, 1876).

the United States in the mid-1800s, was one of the primary proponents of thermometry in American medicine in the nineteenth century, and the thermometer that had been used in the Paris ruse was one of his own design. In books, at meetings of physicians, and in popular magazines, Séguin proposed a variety of thermometers and thermoscopes for different users and purposes. Séguin, who was most famous for his work treating mentally disabled children, was also an advocate for use of the metric system in America; he believed deeply in the power of quantification in medicine and science. Despite the joke played at the Paris Academy of Medicine, Séguin was convinced that technology would eventually be able to provide the certain diagnosis of death.<sup>2</sup>

Séguin also believed that such a powerful tool should not rest only in the hands of physicians. Despite resistance from many of his colleagues in the medical community, he wrote extensively about how mothers and other family members should learn to use thermometers to take and record the temperatures of their loved ones. He believed that this ability, which would be enhanced by the gentleness and knowledge of a mother's touch, would enable mothers to keep better watch for signs of approaching illness. Just as today we keep track of changes in our sleep, blood pressure, and diet in order to ward off health problems later, a vigilant mother would be able to notice immediately when her child's temperature indicated danger, and she could contact a physician right away. To this end, Séguin designed a targeted "mother's thermometer" with its own simplified scale of 1-10 instead of a more traditional scale in degrees Fahrenheit or Celcius.

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<sup>2</sup> Édouard Séguin, "New Clinical Thermoscope," *Scientific American* 34, No. 5 (July 31, 1875), 66.

Despite producing and promoting his inventions in his manual, in professional literature, and to an audience of physicians, Séguin's unique instruments were never widely used. Séguin recognized that thermometry and quantitative symptom tracking were becoming central components of modern medicine, but he did not fully understand why.

At the turn of the century, thermometers became a solution not only to a diagnostic problem but also to a labor problem. Thermometers became useful in part because they reduced a patient's bodily experience to a discrete measurement, one that was not only clear but also comparable to all other temperature measurements. They were not only diagnostic technologies that translated a component of a living body into a form that an individual could understand but also communications technologies that produced information in a form communicable to other people. The data produced by a thermometer could only be transmitted to different people if they interpret it using a shared system. For thermometers, this shared system was the Fahrenheit or Celsius scale.

Many physicians objected to the introduction of the thermometer in medicine because they perceived it to be a threat to their expertise. If a simple tool made of mercury and glass had the power to indicate whether someone was healthy or sick, or alive or dead, then physicians were concerned that they would lose both their cultural authority and their livelihoods.

Instead, physicians were able to realign the hierarchy of medical labor such that it included lay people along with physicians while maintaining the physician's position as

the head. With physicians, nurses, mothers, and even patients all able to detect and record temperature on the same scale, each of their individual temperature readings were comparable with one another and, just as importantly, were in the same “language” of temperature in which the physician was already fluent. The temperature scale enabled a whole network of people to contribute to a single temperature chart and, therefore, to the collection of information on which a physician would base his opinion. The physician, then, was able to delegate the authority for collecting temperature data while maintaining the authority to interpret temperature data.

Séguin believed so strongly in the thermometer’s diagnostic power to read the body that he overlooked, and even eliminated in his own designs, the characteristic that has made them most useful to modern medicine: the standardized Fahrenheit or Celsius scale that made temperatures taken by different people comparable with one another. The thermometer was the first scientific medical instrument to enroll such a large network of nonprofessional workers into the new medical system, creating a model for distributed care that continues into the twenty-first century as we track our own blood pressure, calorie intakes, and even our own fertile potential.

In a use entirely unanticipated by Séguin, but nevertheless related to his desire for an instrument to diagnose life, the thermometer has also become entangled in the quest by both professional scientific researchers and lay women to understand women’s reproductive physiology. For centuries scholars and folk medical theories alike had debated the mechanisms that made women’s bodies fertile and infertile, but after



pioneering research by physicians Mary Putnam Jacobi and Theodoor Hendrik van de Velde into the physiology of menstruation, the thermometer became a crucial tool in the development of fertility tracking practices during the twentieth century.

The fundamental scientific discovery supporting natural family planning is the observation that there is a predictable curve to a woman's basal body temperature during her menstrual cycle. This curve follows a biphasic pattern where temperature is lower during the first portion of her cycle, then reliably and noticeably higher during the second. Most importantly, for a fertility tracker, is the timing of the temperature shift: an increase of more than half a degree Fahrenheit occurs just after ovulation. (In our current understanding, the temperature shift is caused by an increase in the hormone progesterone.) This temperature shift, then, becomes the indicator that a woman is fertile.

Women today turn to temperature tracking for a variety of reasons. In the past several decades, many women have used temperature tracking in conjunction with other assisted reproductive technologies in order to conceive. Other women have religious or political objections to more common forms of birth control; for example, there is a vast network of Catholic resources devoted to natural family planning, as well as a network of feminist, do-it-yourself healthcare activists who prefer birth control methods that aren't made in a lab or controlled by professional gatekeepers. Finally, there are many women who for medical or personal reasons just prefer to use methods that don't involve pharmaceuticals or that they consider to be non-invasive.

Despite its name, natural family planning methods are used today by women who see themselves as a part of a data driven and technological medical system. Their knowledge of ovulation, hormones, and reproduction are undoubtedly scientific, grounded in expert knowledge codified in professional journals and published in medical textbooks.

At the same time, much of the popularity (and some of the credibility) of natural family planning rests in the understanding that it is also “natural.” This naturalness is both rhetorical and epistemological: they know their bodies through seemingly unmediated observation, free of expert intervention. Some natural family planners have reconciled this tension between the natural and the technological understandings of their practices by embracing an intellectual and practical scientific history, seeing themselves not as mere recipients of scientific knowledge but as active participants in its creation. Both scientist and subject, many fertility trackers actively place themselves in a lineage of physicians and scientists, including Mary Jacobi and Th. H. Van De Velde, whom they understand to be their direct ancestors.

Their kinship is based largely on a shared history of practice. All medical patients do crucial work that makes healthcare possible (e.g. keeping symptom diaries, following complex medication schedules, traveling for extended follow-up appointments); this is why the literature on patient noncompliance is an entire genre unto itself. But many natural family planners practice outside of the direct surveillance of a healthcare professional. Yet the tools that they use — standardized charts, specific

terminology, statistical methods, and thermometers — are still the tools of the laboratory and the hospital. As such, they are particularly capable of framing their bodily experiences (what in another context might be referred to as their results) as contributions to a general body of knowledge. As lay users of medical technologies, they produce personalized scientific knowledge, but this work is not without cost.

### **Thermometers Metaphorical and Material**

In 1754, more than a century before the joke of the necrometer was played before the Paris Academy of Medicine, a Female Thermometer was described in *The Connoisseur*. Terry Castle, an American literary scholar, describes an essay by writer Bonnell Thornton, who described a thermometer meant to detect the nature of a woman's propriety on a scale of "Abandoned IMPUDENCE" to "Inviolable MODESTY."<sup>3</sup> Castle writes,

The idea of the 'moralized' thermometer or barometer...was as old as the instruments themselves. With their curious, seemingly animate capacity to 'feel' alterations in the atmosphere, weatherglasses, as they were known in the seventeenth century, lent themselves from the start to metaphoric adaptation.<sup>4</sup>

Part of the appeal of thermometers for this purpose was the personality of mercury, which because of its tendency to move independently and capriciously became

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<sup>3</sup> Terry Castle, *The Female Thermometer: Eighteenth-Century Culture and the Invention of the Uncanny* (New York: Oxford University Press, 1995), 21.

<sup>4</sup> Ibid., 22.

connected to the whims of human character. In the eighteenth century, “mercurial” personalities were almost always female, a designation that derived from perceptions of women’s “fickleness, emotional variability, and susceptibility to hysteria.”<sup>5</sup> Castle demonstrates that thermometers at this time were also evocative of sexual desire — particularly female sexual desire — citing numerous literary examples of metaphorically erotic weatherglasses.

Castle posits that during the nineteenth century the metaphorical potency of the thermometer expanded, transitioning from a female thermometer to a “humanized thermometer,” with cultural ideas about sentimentality expanding to incorporate men as well as women. To some extent, we can see this play out on the metaphorical stage, as “to take someone’s temperature” just as often means to assess their mood as it does to determine their body heat. On the other hand, my dissertation will show just how feminized the thermometer — in both actuality and in metaphor — continues to be throughout the nineteenth, twentieth, and twenty-first centuries. Mercurial temperaments are still primarily a characteristic of women, with the word in contemporary discourse largely referring to women who are aggressive, assertive, or

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<sup>5</sup> Ibid., 25.

managerial.<sup>6</sup> Women fulfill the primary child caring responsibilities of which medical care and temperature taking continue to be a part. During the eighteenth and nineteenth centuries, thermometers were lauded for their ability to diagnose true sickness and weed out mere female hysteria. As medicine professionalized, women took over thermometry in the hospital in their capacity as nurses. And with the increasing popularization of natural family planning, the thermometer has become even further associated with women's bodies and fertility. (See Figure 0.1)

Despite its ubiquity as both a physical object and as a metaphor, the medical thermometer has long been an almost invisible technology. When it is considered, its existence as a manufactured, scientifically-calibrated object is almost always obscured, in part because of the ways that it so quickly became a feminized tool for gendered domestic labor. It has been my goal in this dissertation to excavate the history of the consumer medical thermometer, and in so doing to uncover the hidden work being done by those who wield it.

## Methodological Inspiration

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<sup>6</sup> As I complete this dissertation, another news story about a powerful, "mercurial" woman has erupted. In May 2014, Arthur O. Sulzberger Jr., chairman of The New York Times Company, announced that Jill Abramson had been dismissed as executive editor of *The New York Times* due to "an issue with management in the newsroom." Very few details emerged at the time or in the months since about the exact nature of those issues obliquely cited by Sulzberger, and with a settlement between Abramson and the paper stipulating that neither party would provide details, popular press and discourse was left to speculate, often wildly, about the causes of Abramson's dismissal. What was common in news stories concerning the event, though, was the use of the word "mercurial" to describe Abramson, a word that struck my ear is rare for current internet news discourse. I wasn't the only one to think so: Hadley Freeman wrote about the discourse problem with respect to female authority figures in *The Guardian* ("What do you call a tough female boss? (Answer: boss)," *The Guardian*, May 20, 2014, <http://www.theguardian.com/commentisfree/2014/may/20/female-boss-women-tough-bitchy-soft-weak-jill-abramson-new-york-times>) and a website critiquing the language used to describe Abramson was established at [polarizingmercurial.com](http://polarizingmercurial.com).

I have taken for my methodological inspiration a number of works in the history of technology and cultural history that explore the history of technology's users, the mechanisms through which technology is socially constructed, and the contexts within which ordinary people live their lives. Ruth Schwartz Cowan's work on the consumption junction and her masterful approach to studying technologies in the home in *More Work for Mother* have been exemplars.<sup>7</sup> I have paid attention to the social groups who were stakeholders in thermometry's success or failure — from physicians, nurses, and research scientists to instrument makers and home users — and tell the story of the unintended consequences that reverberated from seemingly unrelated choices. I also draw heavily from David Edgerton's concept of "technology in use" as he presents it in *The Shock of the Old*, and was inspired by his work to think more seriously about "boring" and "normal" technologies.<sup>8</sup> I have also heeded the call of a number of additional feminist historians, including Judy Wajcman and Lerman, Mohun, and Oldenziel, who have articulated the need to focus on users in order counterbalance the many existing historical narratives of the Great Men of invention and engineering.<sup>9</sup>

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<sup>7</sup> Ruth Schwartz Cowan, "The Consumption Junction: A Proposal for Research Strategies in the Sociology of Technology," in Wiebe E. Bijker, Thomas Hughes, and Trevor Pinch, eds., *The Social Construction of Technological Systems: New Directions in the Sociology and History of Technology* (Cambridge, MA: MIT Press, 1987), 261-280; Ruth Schwartz Cowan, *More Work for Mother: The Ironies of Household Technology from the Open Hearth to the Microwave* (New York: Basic Books, 1983).

<sup>8</sup> David Edgerton, *The Shock of the Old: Technology and Global History Since 1900* (New York: Oxford University Press, 2007).

<sup>9</sup> Judy Wajcman, *Feminism Confronts Technology* (State College, PA: Penn State Press, 1991); Nina E. Lerman, Arwen Palmer Mohun, and Ruth Oldenziel, "The Shoulders We Stand On and the View From Here: Historiography and Directions for Research," *Technology and Culture* 38, No 1 (January 1997), 9-30.

Yet it has sometimes been difficult to find source material that sufficiently addresses the experiences of people who, historically, have left very little record behind. In this pursuit I have been inspired by Joel Howell's description of Barbara Duden's approach to studying a physician's casebook, which he articulates as "reading *through*" a primary source rather than simply reading it.<sup>10</sup> From his approach to reading through medical records to unearth the bureaucratic structure of the hospital that created them I was inspired to read through temperature charts and software, and through the papers and proceedings of research scientists and physicians, to reconstruct what the experience of thermometry would have been for women who did not leave records describing it. These historical inferences were then corroborated by other women's explicit recollections, which have been found, among other places, in the narrative portions of parenting manuals and published memories, as well as in the handwritten notes left behind from natural family planning workshops and feedback solicited from instructors.

I have taken methodological cues from cultural historians like Lizabeth Cohen and William Leach, who use advertising, popular publications, and other cultural artifacts to reconstruct a cultural milieu, as well as from the many historians of medicine and science who seek to tell "history from below," to engage seriously with the lives not only

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<sup>10</sup> Joel D Howell, *Technology in the Hospital: Transforming Patient Care in the Early Twentieth Century* (Baltimore, MD: Johns Hopkins University Press, 1996); Barbara Duden, *The Woman Beneath the Skin: A Doctor's Patients in Eighteenth-Century Germany* (Cambridge, MA: Harvard University Press, 1998).

of medical professionals and patients within the medical system but also with regular people going about their lives.<sup>11</sup>

At the moments in my dissertation when my story moves into the present, I have taken a number of steps to conduct my research ethically and responsibly, particularly given the continually shifting expectations of privacy and community in online spaces. In my use of published texts, whether they be manuals or memoirs in print or essays published online, I have preserved the connection of those sources to their stated authors. However, in the research for my final chapter, I read and kept updated on the community posts to a particular fertility tracking message board for a period of approximately six months. Where I use material from these message boards in my dissertation, I do not cite the individual authors, nor do I provide direct quotations from their postings. I have chosen this route to preserve their anonymity (direct quotations are easily searchable online) because, while the board is public and accessible to anyone with an internet connection, the social norms of that space are such that there is an assumption of community that make the space of the message board different than that of a public blog. In managing this middle path, I have relied heavily on Helen Nissenbaum's concept of contextual integrity which, as she describes, "ties adequate protection for privacy to

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<sup>11</sup> William Leach, *Land of Desire: Merchants, Power, and the Rise of a New American Culture* (New York: Vintage Books, 1994); Elizabeth Cohen, *A Consumer's Republic: The Politics of Mass Consumption in Postwar America* (New York: Vintage Books, 2003); Roy Porter, "The Patient's View: Doing Medical History from Below," *Theory and Society* 14, No. 2 (March 1985), 175-198.



norms of specific contexts, demanding that information gathering and dissemination be appropriate to that context and obey the governing norms of distribution within it.”<sup>12</sup>

Finally, Nathan Ensmenger has set an agenda for historians to incorporate the history of computing devices into the histories of a multitude of scientific practices.<sup>13</sup> The history of computers and software is curiously absent within much of the historiography of diagnostic technologies, and my dissertation demonstrates the implications of merging the history of computing with the history of science. I show how for women using thermometers, their tools embody notions of quantification, standardization, and normalization. As they literally insert thermometers into their bodies, and transcribe their bodies onto screens, they are active participants in the remaking of their bodies in the image of their technologies. In this I follow the work of scholars such as Jennifer Light and Jon Agar, revealing the digital — if not yet computerized — antecedents to fertility software and other self-tracking devices, and their embeddedness within the subjectivity of those who performed digital work.<sup>14</sup>

My dissertation has been additionally informed by a number of other scholars who have previously examined the thermometer and its place in history. Stanley Reiser’s work on the history of medical technologies and W. E. Knowles’ Middleton’s work on the history of thermometry in meteorology both provided important historical context that

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<sup>12</sup> Helen Nissenbaum, “Privacy as Contextual Integrity,” *Washington Law Review* (2004).

<sup>13</sup> Nathan Ensmenger, “The Digital Construction of Technology: Rethinking the History of Computers in Society,” *Technology and Culture* 53, No 4 (October 2012), 753-776.

<sup>14</sup> Jennifer Light, “When Computers Were Women,” *Technology and Culture* 40, No 3 (July 1999), 455-483; Jon Agar, *The Government Machine: A Revolutionary History of the Computer* (Cambridge, MA: MIT Press, 2003).

enabled me to understand the landscape of thermometry into which I was entering.<sup>15</sup>

Hasok Chang has done crucial work exploring the creation of temperature as an object of scientific inquiry and use.<sup>16</sup> And Volker Hess has done needed investigation into the role of thermometers and charting in the hospital context.<sup>17</sup>

This manuscript is organized thematically into three major sections. The first, centered around the theme of responsibility, shows how during the early twentieth century women engaged in a particular kind of scientific management for dealing with the problem of their fertility. I analyze how they assumed the epistemological orientation necessary for such a project, and contributed significant scientific knowledge both to researchers in the laboratory and to the practices of other lay women.

In chapter one, I explore the mechanisms of natural family planning, arguing that patients and lay users of medical technologies can be understood as medical laborers rather than as medical consumers. By understanding their practices in this way, I reveal how through their technological labor they have adopted the epistemology of a medical system that views their bodies as work objects, and grown to understand the natural state of their bodies as reducible, standardizable, and controllable.

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<sup>15</sup> Stanley Reiser, *Medicine and the Reign of Technology* (New York: Cambridge University Press, 1978); W. E. Knowles Middleton, *A History of the Thermometer and its uses in Meteorology* (Boston: Johns Hopkins University Press, 1966).

<sup>16</sup> Hasok Chang, *Inventing Temperature: Measurement and Scientific Progress* (New York: Oxford University Press, 2007).

<sup>17</sup> Volker Hess, "Standardizing Body Temperature: Quantification in Hospitals and Daily Life, 1850-1900," *Body Counts: Medical Quantification in Historical & Sociological Perspectives* (Montreal, McGill-Queen's University Press, 2005), 109-126; Volker Hess and J. Andrew Mendelsohn, "Case and Series: Medical Knowledge and Paper Technology, 1600-1900," *History of Science* 48, (2010), 287-314.

In chapter two, I uncover for the first time the intellectual history of the temperature shift at ovulation. I show how the labor of lay women was crucial for the discovery and maintenance of knowledge surrounding this phenomenon, and I show how practitioners have written lay women out of that history.

My principle sources for these chapters include the papers of the Women's Community Health Center, Cambridge, Mass. and the Boston Women's Health Collective, which provide intimate details about fertility education programs and show how women came to understand their bodies as objects of their own scientific inquiry. The papers of Hannah Stone shed light on the intellectual history of human fertility as well as on lay women's experience of fertility in the 1920s and 1930s.

The second section, organized around the theme of trust, examines how women became enrolled in the process of providing scientific medical labor in the care of their children, paying particular attention to the ways that professional became able to trust women's work and women became able to trust the new epistemological grounding the thermometer required.

In chapter three, I argue that despite controversy among physicians surrounding patients' ability to reliably use thermometers or understand the information that they provided, utilizing mothers for medical work was appealing enough to override these concerns. A variety of actors developed technological and labor practices to ensure that mothers' care was trustworthy and to incorporate cultural logic about mothers' instincts and strengths into their use of a diagnostic instrument.

In chapter four, I examine the thermometer's role as a boundary object, examining how the advertising strategy of the nation's leading thermometer manufacturer allowed for the epistemological integration of existing modes of healthful behavior with new Progressive Era reforms. In this chapter I also follow the thermometer within the space of the home, from exterior to interior walls, to the bath, to the sickroom, and to the medicine cabinet, as a way to understand the mechanisms of its domestication.

My principle sources for these chapters include the artifact collection at the Dittrick Medical History Center and Museum, which provided insight into the construction and use of thermometers, as well as how lay users may have approached and encountered them. The papers of the Taylor Thermometer Company illuminated the economic market for thermometers in the early twentieth century, as well as what epistemological arguments for thermometer use were persuasive to their customers. Published manuals of thermometry and advertisements provided insight into the role of women in home health care

My final chapter and conclusion focus on the theme of blame, showing how domestic thermometry has created in patients an expectation of perfect control that has ramifications for their experience of their bodies' limits and potentials. Chapter five explores the history of natural family planning at the turn of the twenty-first century, particularly with respect to computerized fertility tracking and temperature chart sharing. I analyze women's natural family planning practices in light of the cybernetic discourse of the mid- to late twentieth century as a way of analyzing the elision of the technological

and the natural in the subjectivities of fertility trackers. I argue that ideas about the thermometer and human bodies exist within the circuit of a close metaphor that, as they move between professional and lay spaces of scientific inquiry, cement the naturalness and seeming inevitability of creating a quantified self.

My sources in this section include born-digital materials like posts on fertility tracking message boards that reveal the intimate details of women's daily practices, technological expertise, and emotional investments. Analyzing fertility tracking software has allowed me to examine the assumptions and implications of technology manufacturers as well as to explore the ways that computer programming influences women's work of bodily self-programming. My other principle sources in this chapter are published manuals of natural family planning and memoirs written by women who have struggled with their fertility. Their voices and practices, relayed in their own words, illustrate the subjective influence of practicing cybernetic natural family planning, particularly within the context of an American medical system that already places extraordinary responsibility on patients and consequently blames them for their failure to live up to technological and bureaucratic standards.

## Chapter One

### **“A Truth Truer Than a Poem”: The Scientific Labor of Natural Family Planning**

Women's bodies are a problem.

This is a historical fact, not an ontological one. By which I mean, despite innumerable cultural narratives, there is nothing inherently, or self-evidently, problematic about women's bodies. They are not troublesome, wrong, or worrying on their own merits, because of some essential fact about their nature. But they are a problem, historically, because for any number of people they have been understood as being in need of a solution. In a modern worldview dominated by theories of rational control and predictable response, women's bodies could not be made to fit.<sup>18</sup>

For more than a century, physicians, biologists, politicians and other public officials, chemists, activists and reformers, geneticists, members of the clergy, and otherwise lay men and women have designed a dizzying number of interventions to make women's bodies knowable and, more importantly, malleable. The social, medical, and technological means to control women's bodies have been some of the most sought after, lucrative, influential, and controversial discoveries and technologies of the past 150

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<sup>18</sup> For many examples of the ways that women's bodies were rendered exceptional, see Catherine Gallagher and Thomas Laqueur, eds., *The Making of the Modern Body: Sexuality and Society in the Nineteenth Century* (University of California Press, 1987).

years.<sup>19</sup> Strangely the thermometer, despite its influential and inextricable role in these developments, has largely been absent from discussions of these technologies. One of my goals with this dissertation is to investigate how and why the thermometer has been absent from this history, and to explore who and what else our ignorance of the thermometer's history enables us to ignore.

In the field of biology specifically, researchers have long been frustrated by the problem of women's bodies; in the history of biology, the model human organism has generally been male, because women's bodies have been thought to be inherently chaotic and in flux — in other words, entirely unsuitable as a basis for producing stable knowledge about the human species as a whole.<sup>20</sup> When attention has turned to women, the goal has often been to solve this flux — to take the swells of fertility that are understood to be so essential to what it means to be female and discipline them into a recognizable and predictable cycle.

But men (and the more rare women) of science have not been the only ones concerned with the chaos of women's bodies. Fertility has continued to be an aspect of their lives that many women feel they can not control, creating emotional as well as

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<sup>19</sup> For a broad overview of reproductive science, see Adele Clarke, *Disciplining Reproduction: Modernity, American Life Sciences, and 'the Problems of Sex'* (Berkeley, CA: University of California Press, 1998). For a discussion of hormone research and its relationship to feminist concerns, see Celia Roberts, *Messengers of Sex: Hormones, Biomedicine, and Feminism* (New York: Cambridge University Press, 2007). For a broad history of nineteenth and twentieth century birth control advocacy, see James Reed, *From Private Vice to Public Virtue: The Birth Control Movement and American Society Since 1830* (New York: Basic Books, 1978). For a history of the development of the birth control pill, see Lara Marks, *Sexual Chemistry: A History of the Contraceptive Pill* (New Haven, CT: Yale University Press, 2011).

<sup>20</sup> Steven Epstein, *Inclusion: The Politics of Difference in Medical Research* (Chicago, IL: University of Chicago Press, 2009); Londa Schiebinger, ed., *Gendered Innovations in Science and Engineering* (Stanford University Press, 2008).

practical difficulties as they try to manage the number of children they bring into the world. Our cultural narrative tells us that this burden has become somewhat lighter, that the emotional and physical load of birth has been steadily reduced by the efforts of feminists, activists, professional medicine, scientific research, and new technologies. Yet during the course of the twentieth century, a century often characterized by the technological and political progress of women, women's experience of living in their female bodies has remained in some very crucial ways unchanged. Despite the the case law which has established protections for women's access to contraception, the creation of new scientific knowledge about the details of reproductive physiology, and new technologies to aid both birth control and conception, for many women their fertility has remained a mystery. They have remained frustrated, anxious, confused, and scared.

One response to these emotions, and the legitimate challenges upon which they are based, has been a turn toward a system of natural family planning. Many things to many people, natural family planning is at its core a mechanism for understanding, and thereafter manipulating or working with, women's fertility. Women's motivations and goals for seeking the particular type of control offered by natural family planning have been multiple; during the early twentieth- century it was primarily understood as a method of birth control, whereas during the late twentieth-century natural family planning methods have been experiencing a wave of popularity as tools to help women conceive. All uses of natural family planning reflect the peculiar anxieties that women at historically specific moments felt about their bodies and fertility, anxieties that were



largely fueled by a lack of knowledge about the scientific logistics of their ability to conceive. For women using this method, naturally family planning provided the scientific knowledge and technological skills for them to manage their reproductive selves.

Nona Aguilar, a naturally family planning advocate writing in the early 1980s, described a conversation that she had with a young female psychologist. The woman reported, “I used to think of my fertility as something like a slimy green monster lurking in a dark closet, ready to strike with a pregnancy at any time. For years I felt helpless against the ‘monster’ unless I was ‘armed’ with the most powerful contraceptives on the market.” Although slightly less violent in her imagery, Aguilar herself agreed: “There was a time when my reproductive power seemed mysterious, capricious, and highly unpredictable. I did feel that it was ‘ready to strike with a pregnancy at any time.’”<sup>21</sup> Imagining their fertility as something separate from the rest of themselves — and what's more, as something monstrous and malicious — has led women to feel as though, for the vast majority of their lives, they are at war with themselves.

### **Treating Fear with Responsibility**

No one was more familiar with this fear of fertility than Dr. Hannah Stone. Between 1925 and 1941, more than fifty years before Aguilar’s conversation with a young woman frightened of her own fertility, Stone listened to the stories of approximately one hundred thousand women at the Birth Control Clinical Research

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<sup>21</sup> Nona Aguilar, *The New No-Pill No-Risk Birth Control* (New York, NY: Scribner, 1986), 3.

Bureau (BCCRB) in New York City. Founded by birth control activist Margaret Sanger in 1923, the Bureau secured Hannah Stone as its Medical Director in 1925.<sup>22</sup> The young women who visited the clinic often experienced a myriad of sexual and relationship problems which, to Stone, were both tragic and completely avoidable. Stone, still quite young herself — she had received her medical degree just a few years earlier in 1920 — was adamant that women be given adequate education in birth control techniques so that they would no longer be forced to take drastic and dangerous actions out of fear of becoming pregnant.<sup>23</sup>

In the United States at the turn of the century, available birth control technologies and techniques were a mixed bag. On March 3, 1873, the Comstock Act was signed into law, instigating, as historian Andrea Tone puts it, “a century of indignities associated with birth control's illicit status.” The legislation classified contraceptives as “obscene” material, thereby making it illegal to sell or distribute them across state lines or through the postal system.<sup>24</sup> The statute was a response by reactionary reformers to what they saw as a dangerous and immoral increase in contraceptive sale and use during the nineteenth century. After the invention of vulcanized rubber in 1839, a slew of new

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<sup>22</sup> Margaret Sanger, “Hannah M. Stone; In Memorium,” *Human Fertility* (August 1941): 109. Stone and Sanger worked together for decades at the BCCRB, where Stone performed clinical research worked individually with many of the almost 100,000 women that they eventually treated before Stone's death in 1941.

<sup>23</sup> Hannah Stone, *Sexual Disharmonies*, c. -1937 1925, Box 12, Folder 34, Abraham Stone Papers, 1916-1959. H MS c157, Harvard Medical Library, Francis A. Countway Library of Medicine, Boston, Mass.; “Who's Who Among Association Executives: Stone, Hannah M.,” November 6, 1934, Box 12, Folder 34, Abraham Stone Papers, 1916-1959. H MS c157, Harvard Medical Library, Francis A. Countway Library of Medicine, Boston, Mass.

<sup>24</sup> Andrea Tone, *Devices and Desires: A History of Contraceptives in America* (New York: Hill and Wang, 2001), 4.

barrier methods had entered the market, as well as syringes for douching and intrauterine devices (IUDs). These methods joined withdrawal, suppositories, prolonging lactation, and abstinence as popular forms of birth control.<sup>25</sup>

But with the statute newly in place, selling birth control devices — or even providing birth control information — became an underground business. As a result, as Tone shows, birth control devices were often advertised for another purpose (e.g. sponges intended to keep the vaginal canal “germ free,” or IUDs intended to treat uterine prolapse). In this environment where larger scale manufacturers may have felt limited by the legal risks involved in selling their wares to a dispersed market, small-scale entrepreneurs stepped in to fill the gap. But if birth control technologies remained a relatively thriving business between the 1870s and 1930s, then why were the women that Hannah Stone spoke with still so fearful of pregnancy?<sup>26</sup> They wrote and visited agencies like the BCCRB by the thousand, asking for more reliable information to prevent themselves from becoming pregnant. Most already had multiple children, and sought to keep their family from growing further.<sup>27</sup>

What their letters make clear is that the fear of pregnancy was about both access to tools *and* access to knowledge. While the need for both is in no way a new observation — this has been the mantra of feminist activism specifically and public health care

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<sup>25</sup> Ibid., 14–15.

<sup>26</sup> For a user-driven account of contraception during the 19th century, see Janet Farrell Brodie, *Contraception and Abortion in 19th-century America* (Cornell University Press, 1997).

<sup>27</sup> Stone, *Sexual Disharmonies*.

activism more generally for decades — we nevertheless often define the “knowledge” under discussion in the realm of birth control much too narrowly. In other words, teaching a woman how to use a diaphragm was important, but doing so made her only marginally more aware of her anatomy, and not at all more aware of her *fertility* and the physiological processes by which it worked. With a new medical science slowly stripping authority away from more experiential modes of knowing the body, individuals were left trying to fill in the gaps while in many instances lacking the tools to do so. Women had limited access not only to birth control technologies, but also to knowledge about when, why, and how their bodies actually became pregnant — women were as afraid of their own bodies as they were of the possibility of another child, because their bodies remained largely unknown. What's more, for most women, they remained largely *unknowable*.

However, at the BCCRB we can find the beginnings of the ways that women attempted to reconcile this epistemological problem. During the early 1930s, there was a global surge in interest surrounding the “rhythm” method of birth control (also often called the safe period method). A new version of rhythm was being touted by scientists, one which was entirely based on attempts to deduce the inner workings of female biology using new statistical methods and objective data. In this case, that data was related to attempts to determine the standard number of calendar days in a woman's menstrual cycle. As Stone described,

The human male produces spermatozoa all the time — he is always fertile. The

female produces ova only periodically — every month ovulation takes place. It lasts only 24 to 48 hours. Therefore, if we know when ovulation takes place, since conception can not take place at any other time a woman can, by abstaining from intercourse during ovulation, prevent conception. That is the basis of the 'safe period'.<sup>28</sup>

Determining the date of ovulation was the key. For most scientists studying reproduction at this time, including those familiar to Sanger, Stone, and their colleagues, the only acceptable method to determine ovulation was to count the days of a woman's menstrual cycle on a calendar.<sup>29</sup>

This method attracted women by the thousand, who worked with scientists or medical practitioners like Stone to chart their cycles on pre-printed calendar cards. Women were asked to record their exact cycle days for as long as ten months to a year, and then professionals like Stone interpreted that information for them. Stone wrote:

On the basis of [her cycle length], I prescribe her safe period — mark her card with a green pencil — “go ahead” — indicating the days when she can have a sexual relationship without conceiving. When her next menstrual cycle begins,

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<sup>28</sup> Hannah Stone, “Contraception, Medical Papers, 1930-1935”, c. -1935 1930, Box 12, Folder 29, Abraham Stone Papers, 1916-1959. H MS c157, Harvard Medical Library, Francis A. Countway Library of Medicine, Boston, Mass.

<sup>29</sup> This sudden global interest was the result of two studies that were simultaneously published in English in 1934, one by Hermann Knaus of Germany and one by Kyusaku Ogino of Japan, who independently discovered calendar-based patterns in women's ovulation. Hermann Knaus, *Periodic Fertility and Sterility in Woman: A Natural Method of Birth Control* (Chicago Medical Book Company, 1934).; Kyusaku Ogino, *Conception Period of Women* (Harrisburg, PA: Medical Arts Press, 1934). However, these scientists were not the only individuals who were studying the mechanisms of women's fertility; in the following chapter, I will explore in further detail the history of research on women's menstrual cycles as well as the uneven dissemination of the knowledge that was produced.

she puts the card in an envelope and mails it back to me and I mark it for the next month, and so on — month after month.<sup>30</sup>

Through their cards, women began the process of trying to use external diagnostic criteria (in this case, calendar days) in order to infer changes in their internal physiology.

Although long-derided as anti-scientific, this new rhythm method (as calendar-based birth control methods have generally been called)<sup>31</sup> was based on a scientific medical epistemology, one that incorporated new statistical methods for determining a general standardized menstrual cycle from aggregated data taken from individual women. (See Figure 1.1)

As the rest of this chapter will show, we can see in this practice of recording and analyzing menstrual cycle data the germination of the practices that would come to mark temperature-based methods of natural family planning during the century that followed. From these early attempts to systematically predict their fertile periods with a medical professional, women grew to take on more and more responsibility for determining their fertile periods themselves using the methods, tools, and knowledge of medical science.

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<sup>30</sup> Stone went on to indicate how this practice was beneficial both for her patients and for Stone's own research at the Bureau. Her patients also indicated on their charts when they had had intercourse without using contraceptives, and Stone used this information to refine her methodology. Stone herself was somewhat skeptical about these calendar methods and the notion of a safe period at this time, although she continually worked with other researchers and her patients to gather information. A more thorough account of Stone's work appears in Chapter 2. Stone, "Contraception, Medical Papers, 1930-1935."

<sup>31</sup> For a more thorough history of the calendar-based rhythm method in the early twentieth century, see Paula Viterbo, "The Promise of Rhythm: The Determination of the Woman's Time of Ovulation and Its Social Impact in the United States, 1920-1940," PhD dissertation, State University of New York at Stony Brook, 2000.

## Patient Labor and Epistemological Change

Concurrent to the Comstock era at the turn of the century, vast changes in the practice and profession of medicine were also taking place that profoundly affected how both professionals and lay individuals thought about their health and bodies. A new germ theory of disease developed, with proponents positing that diseases of the body were caused by specific infectious agents that would provoke relatively standard reactions even in different bodies. This idea developed in tandem with new diagnostic medical technologies that enabled physicians to break down physiological symptoms into discrete and quantifiable units; they began recording patients' temperature and blood pressure numerically rather than as a qualitative description of their relative heat or the threadiness of their pulse.<sup>32</sup> As many scholars have shown, in the aggregate these changes in medicine resulted in profound changes in the ways that physicians understood and treated the body; through the process of recording and analyzing patients's symptoms in quantitative form, physicians came to view patients as standardized units. Their bodies could be mapped onto a statistical curve, and the illness in need of treatment was their deviation from a supposedly healthy norm. The specialization of medical professions

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<sup>32</sup> An early canonical discussion of general trends in medical technology is Stanley Reiser, *Medicine and the Reign of Technology* (New York: Cambridge University Press, 1978).

further amplified these trends.<sup>33</sup>

But this focus on the changing work practices of experts overlooks the simultaneously changing practices, and resulting epistemology, of lay individuals.<sup>34</sup> Historians of medicine have worked for decades to detail what these changes have meant for practitioners, from the highly fragmented elite of medical specialists to less prestigious classes of workers like nurses and, increasingly, hospice and home health care aids.<sup>35</sup> But few have examined what these changes in medical practice, spaces, and epistemology have meant for the very people this network is intended to serve. Patients did not only experience new medical approaches and practices when they visited their physicians — they also experienced marked changes in at-home, non-expert care, and they began to perform increasingly scientific medical work themselves.

Not long after their introduction in the clinic, patients began using new antiseptics,

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<sup>33</sup> As medical workers came to focus solely on certain groups of people or certain body parts, performing medical care became ever more reductionist and even more dependent upon a cadre of experts. For more of the extensive historiography on these trends see, for only a few examples, Charles Rosenberg, “The Therapeutic Revolution: Medicine, Meaning, and Social Change in Nineteenth-Century America,” in *The Therapeutic Revolution: Essays in the Social History of American Medicine*, ed. Morris J Vogel and Charles Rosenberg (Philadelphia, PA: University of Pennsylvania Press, 1979).; Rosemary Stevens, *In Sickness and in Wealth: American Hospitals in the Twentieth Century* (Baltimore, MD: Johns Hopkins University Press, 1999).; Roy Porter, *The Greatest Benefit to Mankind: A Medical History of Humanity* (New York, NY: W. W. Norton & Company, 1999).; Charles Rosenberg, *The Care of Strangers: The Rise of America’s Hospital System* (Baltimore, MD: Johns Hopkins University Press, 1995).; W. F. Bynum, *Science and the Practice of Medicine in the Nineteenth Century* (Cambridge, UK: Cambridge University Press, 1994).; John Harley Warner, *The Therapeutic Perspective: Medical Practice, Knowledge, and Identity in America, 1820-1885* (Princeton, NJ: Princeton University Press, 1997); Joel D Howell, *Technology in the Hospital: Transforming Patient Care in the Early Twentieth Century* (Baltimore, MD: Johns Hopkins University Press, 1996).

<sup>34</sup> For a notable historiographical example that takes seriously such lay epistemology, see Nancy Tomes, *The Gospel of Germs: Men, Women, and the Microbe in American Life* (Boston: Harvard UP, 1998).

<sup>35</sup> For a few examples, see Paul Starr, *The Social Transformation of American Medicine: The Rise of a Sovereign Profession and the Making of a Vast Industry* (New York, NY: Basic Books, 1984).; Rosenberg, *The Care of Strangers: The Rise of America’s Hospital System*.; Barbara Melosh, *The Physician’s Hand: Nurses and Nursing in the Twentieth Century* (Philadelphia, PA: Temple University Press, 1982).



pain relievers, and diagnostic tools like thermometers. This change in behavior often came at the behest of experts, but experts' pleas did not come without explanation or justification. Articles in popular magazines like the *Ladies' Home Journal*, advertisements in catalogues, and educational bulletins from the federal government all explained not only what new technologies to buy, but also how they worked. In order to use new medical technologies as experts desired, lay users had to share with professionals a scientific epistemology of their own bodies; a mother would not be convinced to use a thermometer on her child if she did not believe that a quantitative measure of his temperature was relevant, reliable, and actionable information. She had to believe that human bodies were standardized around a normal body temperature, and that deviations from the norm meant ill health, rather than just idiosyncrasy.

Furthermore patients did not merely purchase new medical drugs and devices and consume them immediately; they incorporated them into the health care that they were performing for themselves and their family members over the long term, often without the input or oversight of professional caregivers of any kind. Medical work — not medical consumption — became the practical model for how many women interacted with new products and tools. As a result of using the same kinds of medical technologies as their physicians, they grew to adopt — and recreate — the epistemological orientation of their physicians.

Histories that focus on patients — so-called “history from below” — have pointed attention toward the experience of patients within medical systems, but these histories

rarely question the place of the patient within two highly limited medical narratives. One of the most common narratives is that of the resistant and untrusting patient. Women, specifically, are said to have subjective, specialized knowledge of their bodies that is incompatible with the epistemology of their physicians. This disconnect between their own lived experience and their physicians' obsession with data, we are told, has left them frustrated and at times resistant to care.<sup>36</sup>

The second common narrative of patient experience seeks to explain the somewhat opposing model of the patient as an empowered activist and advocate for her own health care needs. This model champions a patient's decision-making ability as the paramount expression of her agency, and is often seen as a solution to more ethically fraught doctor/patient relationships of earlier periods. Steven Epstein, for example, explores the influence of AIDS activists and other illness sufferers to show how they have fought for their rights to be believable scientific knowers and witness for their own experiences, as well as for the right to be even more literally part of the scientific knowledge-apparatus through their participation in clinical trials.<sup>37</sup> But in many ways speaking about health care in the language of access leads us down a particular analytical path: access often implies ability to possess, which in America usually means ability to buy.

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<sup>36</sup> For some exploration of these narratives, see Carolyn Merchant, *The Death of Nature: Women, Ecology, and the Scientific Revolution* (San Francisco, CA: Harper San Francisco, 1982).; Rosenberg, "The Therapeutic Revolution: Medicine, Meaning, and Social Change in Nineteenth-Century America.", D S Jones, "Technologies of Compliance: Surveillance of Self-Administration of Tuberculosis Treatment, 1956-1966," *History and Technology* 17, no. 4 (September 2004): 279–318.

<sup>37</sup> Steven Epstein, *Impure Science: AIDS, Activism, and the Politics of Knowledge, Medicine, and Society* (Berkeley, CA: University of California Press, 1996); Steven Epstein, *Inclusion: The Politics of Difference in Medical Research* (Chicago, IL: University of Chicago Press, 2009).

Both of these models presuppose the most common general characterization of the patient in the discourse of both historians and our historical actors: the patient as consumer.<sup>38</sup> What we don't like, we won't buy, and with the right tools and information we can choose the treatment that works for us, within whatever definition of “works” we define. But the consumer-patient model that we have mapped onto health care relationships for most of the past century misunderstands crucial aspects of the patient's role in a complex medical system. It limits our understanding of their agency to its expression at the point of sale, with a patient's options being reduced to a decision to buy, or not. Furthermore, it faces all of the critiques that plague consumerism more generally. It presupposes (like our general model of consumerism) that patients have the tools and expertise necessary to obtain and understand all aspects of their health and the medical system at large in order to make an “informed” decision. It also operates as if patients have unlimited flexibility in the providers of their health care, which restraints like geography, income, and insurance systems have never afforded.<sup>39</sup>

Finally, a consumer model overlooks all of the health care behaviors that patients

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<sup>38</sup> See, for only a few of many examples, Stevens, *In Sickness and in Wealth: American Hospitals in the Twentieth Century*.; Nancy Tomes, “Merchants of Health: Medicine and Consumer Culture in the United States, 1900-1940,” *Journal of American History* 88 (September 2001): 519–547.; Nancy Tomes, “Patients or Health-Care Consumers? Why the History of Contested Terms Matters,” in *History and Health Policy in the United States: Putting the Past Back In (Critical Issues in Health and Medicine)*, ed. Rosemary Stevens, Charles Rosenberg, and Lawton Burns (Piscataway, NJ: Rutgers University Press, 2006), 83–110.; Renee Fox, “The Medicalization and Demedicalization of American Society,” *Daedalus* 106, no. 1 (October 1977): 9–22..

<sup>39</sup> For more on the extensive history of consumerism in the United States, particularly the way consumerism becomes embedded in other national discourses of citizenship and empowerment, see, for example, Lizabeth Cohen, *A Consumer's Republic: The Politics of Mass Consumption in Postwar America* (New York, NY: Knopf, 2003).; Stuart Ewen, *Captains of Consciousness: Advertising and the Social Roots of the Consumer Culture* (New York: McGraw-Hill, 1976).; T J Jackson Lears, *Fables of Abundance: A Cultural History of Advertising in America* (New York: Basic Books, 1994).; William Leach, *Land of Desire: Merchants, Power, and the Rise of a New American Culture* (New York: Vintage, 1994).

perform that do not occur at the point of sale (i.e. in the doctor's office, in the presence of a professional). A consumer model shifts focus away from a constellation of patient actions, decisions, adaptations, and negotiations. It ignores whether patients eventually use the products or advice that they purchase; the successes or failures they may experience; the adaptations that they may need to make to devices or to their instructions; the tacit knowledge that they develop and share.<sup>40</sup> A consumer model also flattens the relationship between a patient and a care provider, obfuscating the nature of their relationship with another. It operates as if patients and providers neutrally share information with one another, removing the emotional and affective component of doctor-patient interaction that have been shown to be crucial components of the doctor-patient relationship.<sup>41</sup>

An alternate model of patienthood is to understand the patient as a medical laborer, rather than a medical consumer. If we see patients as participating agents in a large network of health care work, it enables us to think more critically about the distribution

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<sup>40</sup> Here I draw on the user-focused scholarship in the history of technology and the social construction of technology tradition. For my most influential and favorite examples, see Ruth Schwartz Cowan, "The Consumption Junction: A Proposal for Research Strategies in the Sociology of Technology," in Wiebe E. Bijker, Thomas Hughes, and Trevor Pinch, eds., *The Social Construction of Technological Systems: New Directions in the Sociology and History of Technology* (Cambridge, MA: MIT Press, 1987), 261-280; Ronald Kline, *Consumers in the Country: Technology and Social Change in Rural America* (Baltimore, MD: Johns Hopkins University Press, 2000); David Edgerton, *The Shock of the Old: Technology and Global History Since 1900* (New York: Oxford University Press, 2007); Nelly Oudshoorn and Trevor Pinch, eds., *How Users Matter: The Co-Construction of Users and Technology* (Cambridge, MA: MIT Press, 2003).

<sup>41</sup> My approach in this analysis has been heavily influenced by literature in the history of technology that focuses primarily on users and their experiences interpreting, adapting, and sharing information about the technologies that they use. Applying this approach to studies of the history of medical practice lends methodological aid to the study of an oft-invisible group. See, for example, Nelly Oudshoorn and Trevor Pinch, *How Users Matter: The Co-Construction of Users and Technology* (Boston: MIT Press, 2005); Ruth Schwartz Cowan, *More Work for Mother: The Ironies of Household Technology from the Open Hearth to the Microwave* (New York: Basic Books, 1983).

of responsibilities among members and the channels through which information flows. Furthermore, it allows us to interrogate more fully the “caring labor” that is performed by patients as they seek to accommodate their physicians and meet expectations.<sup>42</sup> It also allows us to think about the implications of such a system of medical labor for its participants. If patients are laboring, what are they producing? If they are working to create a body that fits certain standards of health, then how might this labor affect their relationship with that body? Finally, the distribution of responsibility inherent in a labor relationship is fundamentally different than that of a consumer responsibility. A failed consumer decision, theoretically, damages only the consumer's personal satisfaction.<sup>43</sup> But a failed labor decision holds implications for every other member of the network. (This may help to explain, in part, the extensive mechanisms in place for disciplining patients’ behavior, both socially and within the medical network.)<sup>44</sup> For women who hope to manage their fertility, their work effects not only themselves but their partners,

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<sup>42</sup> Nursing scholars like Barbara Melosh and Margarete Sandelowski have shown how emotional work is crucial to the relationship between physicians and nurses, and I argue that it is also useful in thinking about the working relationship between physicians and patients. Melosh, *The Physician's Hand: Nurses and Nursing in the Twentieth Century*; Margarete Sandelowski, *Devices & Desires: Gender, Technology, and American Nursing* (Chapel Hill, NC: The University of North Carolina Press, 2000).. The concept of “caring labor” comes from Nancy Folbre's work, where she defines it as “labor undertaken out of affection or a sense of responsibility for other people, with no expectation of immediate pecuniary reward.” Nancy Folbre, “‘Holding Hands at Midnight’: The Paradox of Caring Labor,” *Feminist Economics* 1, no. 1 (October 1995).

<sup>43</sup> Cohen, *A Consumer's Republic: The Politics of Mass Consumption in Postwar America*.. Some have pushed the argument for consumer responsibility further than person satisfaction; given that American's view consumerism as their primary means to express their citizenship, the definition for doing so responsibly often reveals layers of values and obligations beneath the surface. This too, however, grants consumers all of the responsibility and blame for their consumption patters, while leaving the other members of the network to benefit.

<sup>44</sup> Peter Conrad and Joseph Schneider, *Deviance and Medicalization: From Badness to Sickness* (Philadelphia, PA: Temple University Press, 1992).; Fox, “The Medicalization and Demedicalization of American Society.”

their children, their families, their communities, and any and all health care providers who become enrolled in their project of birth control or conception. The weight of this responsibility is immense. As one young woman put it after experiencing an unintended pregnancy, “I was left with the feeling that I had failed at something that was my job.”<sup>45</sup>

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In summarizing case reports from a number of her patients, Hannah Stone described how “the fear of conception...hangs like the sword of Damocles [sic] over every sex intimacy” for the women whom she treated.<sup>47</sup> As those familiar with the legend know, the sword represents the perpetual danger and burden of the king's wealth; when Damocles remarked that the king lived a life of luxury, the king responded by providing Damocles both with extraordinary wealth and the threat of a sword, hanging above his head by a horse hair. The comparison to fertility is apt. Much of the literature and analysis of fertility — which is almost always about *women's* fertility — rests on an essentialist reading of women's bodies that ties them both to nature and to the past. It has been argued both by feminists and scientists that women feel their bodies more intimately, more acutely, than men do, because of their ability to create life from and

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<sup>45</sup> Aguilar, *The New No-Pill No-Risk Birth Control*, 177.

<sup>46</sup> This labor model of patienthood was inspired, in part, by Ruth Schwartz Cowan's work, in which she describes the technological labor of domestic housework. Schwartz Cowan, *More Work for Mother: The Ironies of Household Technology from the Open Hearth to the Microwave*. In searching for others who have applied the analytical model of laborer to patients, I uncovered a rarely cited 1989 article by Carolyn Wiener in a medical journal focused on arthritis; few others have explored the implications of such a reconceptualization. Carolyn Wiener, “Untrained, Unpaid, and Unacknowledged: The Patient as Worker,” *Arthritis Care and Research* 2, no. 1 (March 1989): 16–21.

<sup>47</sup> Stone, *Sexual Disharmonies*.

within it.

But by casting this ability — both extraordinary in its power and remarkably ordinary in its ubiquity — as somehow outside of the realm of scientific labor when it is experienced on an individual level, we ignore the ways that lay women's bodies became scientific objects for them, as well. The sweeping changes in medical practice, technology, and knowledge did not merely pass patients by, or create an epistemologically opaque system which they must resist. These changes were experienced by lay individuals at the most intimate level. What's more, these changes were *enacted* by lay individuals at this most intimate level, through their daily practices living in and working with their bodies. The sword of Damocles hanging over women's fertile bodies was — and continues to be — their unceasing responsibility to scientifically manage their reproductive selves. The wealth of their fertility is often seen as a gift in its potential, but a curse in the way that it overwhelms so many areas of their lives and demands so much of their attention. Women know that they have a job to do, but what they are rarely clear on is exactly how to do it.<sup>48</sup>

### **The Desire for a Lab Manual**

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<sup>48</sup> This discussion is somewhat in conversation with debates among some researchers that occurred during the mid-twentieth century concerning the classification of marital sexual activity as work. Masters and Johnson as well as Talcott Parsons, in particular, wrote that the labor of sexual performance fell disproportionately on the male partner in a male-female partnership (confining the “work” of sexual performance to the act of intercourse only), and other writers throughout the 1960s and 1970s wrote at length about the various “responsibilities” of felt by men in sexual activity. William H. Masters and Virginia E. Johnson, *Human Sexual Response* (Boston: Little, Brown, and Company, 1966); Talcott Parsons and Robert F. Bales, *Family, Socialization and Interaction Process* (Glencoe, Illinois: The Free Press, 1955).

Adrienne Rich was one of the most influential second-wave feminist writers of her generation, a poet and essayist who often described the experience of living in a female body. In the course of my research, I have found her to be quoted extensively by women during the practicing fertility tracking as well as by scholars of women's health and history. One of her most famous books, *Of Woman Born*, published in 1976, began, “All human life on the planet is born of woman. The one unifying, incontrovertible experience shared by all women and men is that months-long period we spent unfolding inside a woman's body.”<sup>49</sup> Even in a world which today often turns to advanced reproductive technologies to manipulate the distance between a woman's body and a child,<sup>50</sup> in order to live children still must be *born* — a womb must bear their weight, a female body must hold and carry them, and she must bring them forth into the world.

In possibly the most oft-quoted passage of her prolific writing career, Rich went on to declare, “I know no woman — virgin, mother, lesbian, married, celibate — whether she earns her keep as a housewife, a cocktail waitress, or a scanner of brain waves — for whom her body is not a fundamental problem: its clouding meaning, its fertility, its desire, its so-called frigidity, its bloody speech, its silences, its changes and mutilations, its rapes and ripenings.”<sup>51</sup> As she described the events of her life as a mother, a writer, and a patient, Rich continually circled around this notion of the problem of the female

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<sup>49</sup> Adrienne Rich, *Of Woman Born: Motherhood as Experience and Institution* (New York: W. W. Norton & Company, 1986), 11.

<sup>50</sup> For example, assisted reproductive technologies that allow conception to occur outside of the body.

<sup>51</sup> *Ibid.*, 284.



body, one which she viewed not as one of fact but of institution. The institution of motherhood in our cultural lives, and by extension the institution surrounding feminine fertility, has historically been outside of the control of the women to whom it has belonged. And while her discussion and awareness of this problem extended to social issues on a vast scale, it began with a deeply personal revelation: the unintended pregnancy that resulted in her third child. She wrote, “I had learned that my body was not under my control.”

Scholars have written at length about this lack of control and the feminist activism that sought to address it. The feminist self-help movement was responsible for creating organizations nationwide that offered support and education to women in the project of getting to know their own bodies.<sup>52</sup> The movement stated explicitly that its intent was to take the knowledge and the tools of a patriarchal medical system and teach women how to wield them themselves. Rich, in the afterword of *Of Woman Born*, issued a similar call to action:

But what do we do with our lives?...The women's health-care movement, challenging the ignorance and passivity fostered in women by the male medical profession, is a spreading force, already having an incalculable effect on a new generation of women.

She claimed that in order to engage with motherhood in new ways, women must

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<sup>52</sup> The literature on this topic is quite extensive. For more information, see Sandra Morgen, *Into Our Own Hands: The Women's Health Movement in the United States* (New Brunswick, NJ: Rutgers University Press, 2002).; Wendy Kline, *Bodies of Knowledge: Sexuality, Reproduction, and Women's Health in the Second Wave* (Chicago, IL: The University of Chicago Press, 2010).

engage with medicine in new ways, as this scientific discipline had become completely entangled with the meaning and practice of motherhood and femininity. She called on women not only to engage by becoming scientists, but to also create networks of peer education and to monitor from the outside the kinds of research being conducted by professionals.<sup>53</sup> This call harkened back to her conclusion from the first chapter, which came after the wrenching description of her final pregnancy:

I have come to believe, as will be clear throughout this book, that female biology — the diffuse, intense sensuality radiating out from clitoris, breasts, uterus, vagina; the lunar cycles of menstruation; the gestation and fruition of life which can take place in the female body — has far more radical implications than we have yet come to appreciate. Patriarchal thought has limited female biology to its own narrow specifications. The feminist vision has recoiled from female biology for these reasons; *it will, I believe, come to view our physicality as a resource, rather than a destiny.*” (Emphasis mine)

But as we will see, this was a gambit that was not without consequences, not when we have understood resources to be the intellectual or capital means of production; not when the system into which we have fed those resources is one for scientific production; not when the seduction of technology can allow us to equate our bodies with their medicalized formulations. The women's self-help movement even explicitly used the language of scientific spaces; courses often ran “labs” that were experience-based

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<sup>53</sup> Rich, *Of Woman Born: Motherhood as Experience and Institution*, 282–286.

workshops in learning to perform bodily exams, where women performed gynecological exams, took vital signs, and performed wet mounts to examine samples under microscopes.<sup>54</sup> By adopting this language, women not only signaled that they were performing the scientific medical labor in their practices, but they also traded on the epistemological weight of the scientific laboratory. While this was crucial to understanding the power systems that were already creating knowledge about women's bodies, it also played a role in allowing women to similarly view the materiality of their own bodies as a resource to be exploited.

The most iconic medical technologies of this movement are probably the mirror and the speculum, which women used in tandem to examine their own cervixes. In her study of this practice, historian and women's and gender studies scholar Michelle Murphy explains their motivation. "The central epistemological principle of feminist self-help, as with radical feminism more generally, was that all knowledge production should begin with women's experiences."<sup>55</sup> One of the central images of the movement was an image which featured a fist holding a speculum. But as Murphy is right to emphasize, the speculum is a tool with its own history (she mentions that its modern incarnation was invented by a man who performed experiments on enslaved women),<sup>56</sup> which enabled a

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<sup>54</sup> Later this chapter will discuss a course by the Women's Community Health Center of Cambridge, MA, which offered these women's health care services. "Educational Program [17-week Program on Women's Healthcare], 1974-1975, N.d.", n.d., Box 12, Folder 3, Women's Community Health Center Records, Schlesinger Library, Radcliffe Institute, Harvard University..

<sup>55</sup> Michelle Murphy, "Immodest Witnessing: The Epistemology of Vaginal Self-Examination in the U.S. Feminist Self-Help Movement," *Feminist Studies* 30, no. 1 (April 2004): 117.

<sup>56</sup> *Ibid.*, 123–124.

way of seeing that was grounded in the history of its development.

Describing other procedures performed by self-help activists, she writes, “Looking in a microscope was not a neutral gaze taking in a self-evident world; it was an action circumscribed by a political apparatus that re-represented entities already codified by conventional gynecology.”<sup>57</sup> The practitioners of feminist exams had practical and epistemological reasons for emphasizing the unmediated naturalness of their methodology; they needed to evade prosecution for performing medical work without a license, and the legitimacy of their work depended on its ability to remain close to the body, offering truth. This does not, however, negate the implications of their rhetoric.

When women assume a “conquering gaze”<sup>58</sup> when examining their own bodies, it has the potential to alienate them further from their own lived experience. When this male, technological, control-fetishist gaze is combined with a view of medical practice as labor, Marx's particular model of alienation becomes an apt lens through which to interpret the practices of modern lay health care practices. Murphy describes a woman's place in this system as an immodest witness, referring to work in the history of science that describes the ideal witness as an observer devoid of subjective influence (hence, the modesty upon which Murphy is playing).<sup>59</sup> In contrast, her immodest witness “not only refused the disembodied eye, but literally displayed her embodiment in an act of

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<sup>57</sup> Ibid., 131.

<sup>58</sup> Ibid., 137.

<sup>59</sup> For example, Steven Shapin and Simon Schaffer, *Leviathan and the Air-Pump: Hobbes, Boyle, and the Experimental Life* (Princeton, NJ: Princeton University Press, 1989).; Donna J Haraway, *Modest\_Witness@Second\_Millennium. FemaleMan\_Meets\_OncoMouse: Feminism and Technoscience* (New York: Routledge, 1997).

observing herself... The immodest witness was concerned with unmasking the crafting of knowledge and drawing attention to who was allowed to partake in that labor.”<sup>60</sup>

Several decades later Katie Singer would describe a woman’s relationship with her body in terms that were simultaneously natural and alienated:

Like the earth’s surface, a woman of childbearing age cycles through phases of cooling and heating, which in turn create moistening and drying, which in turn create a fertile environment for life to evolve. Rocks, glaciers, plants, and animals (including humans) all evolve in concert with these processes. In the same way that a meteorologist predicts weather by observing patterns of heating and cooling and moistening and drying at the earth’s surface, a woman of childbearing age can observe her body’s fertility signals and know whether or not she’s ovulating, when she’s fertile and infertile, if she’s prone to ovarian cysts or miscarriage, if she’s pregnant, and more.<sup>61</sup>

Singer did not simply compare women’s bodies to nature. She also compared women to scientists, who must observe their body instrumentally.

But Murphy recognizes the dual subject-object nature of the immodest witness without fully recognizing the alienation from self that might result from that disjuncture; particularly when self-exam moves from investigation for knowledge's sake to interrogation for the purposes of action, the distance between subject and object grows

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<sup>60</sup> Murphy, “Immodest Witnessing: The Epistemology of Vaginal Self-Examination in the U.S. Feminist Self-Help Movement,” 138–139.

<sup>61</sup> Singer, *Garden of Fertility*.

and a new type of modern consciousness emerges. What might raising this particular kind of consciousness mean?

### **Fertility Consciousness: Awareness in the Service of Control**

In the fall of 1979, a small group of women met at the Blackstone Square Community School in Boston's South End. Some of them Boston residents, and some from nearby communities in Cambridge, Waltham, Littleton, Allston, and Jamaica Plains, these women met for a class sponsored by the Women's Community Health Center (WCHC) of Cambridge titled "Fertility Consciousness: Woman Controlled Natural Birth Control." As almost every participant explained, they were "oriented towards body awareness,"<sup>62</sup> which in this case (as in many other areas of women's health) actually meant awareness, specifically, of their bodies' fertility. To put an even finer point on it, this meant being aware of how their fertile bodies *functioned*: the appearance and role of their anatomy, the reasons for the seeming unpredictability of their cycles, and the connection between their internal body chemistry and observable physical signs. As one participant from Jamaica Plains put it, bluntly, "I want to know how my body works."

For some women, this knowledge could help them feel that they were "more in touch" with their bodies and their selves, and they had no intention of using that knowledge for any actionable purpose. One woman from Allston, for example, was satisfied with using her diaphragm as her primary method of birth control, and was

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<sup>62</sup> "Intake Forms", 1979, Box 12, Folder 6, Women's Community Health Center Records, Schlesinger Library, Radcliffe Institute, Harvard University.

enrolled in the class simply to learn. But far more often than not, class members were interested to know how their bodies could provide them with information that was, above all else, practical and useful. While they were appreciative to learn, they were also eager to act: they repeated again and again that they wanted to put their knowledge to use as soon as possible, either so that they could finally become pregnant, or so that they could finally cease using other birth control methods that had given them endless problems. Participants complained of a range of side-effects from non-natural birth control including weight gain, messiness, depression, expense, partner dissatisfaction, and exacerbation of other medical problems. Several others had a much more serious complaint: unintended pregnancy.<sup>63</sup>

The methods of natural birth control taught by courses like this one have historically gone by — and continue to go by — a variety of different names. Fertility awareness, natural family planning, natural birth control, and many other similar terms encompass a set of birth control practices that, generally speaking, are described by their users as “natural” alternatives to more conventional methods. Practitioners often consider the variety of hormonal, chemical, and barrier birth control methods available to them to be too medical, high-tech, invasive, disruptive, commercial, or unnatural for them to use comfortably. As the teaching materials for the WCHC put it:

[Natural birth control] does not introduce any substances or devices into a woman's body which suppress or change her normal sexual functioning. Rather, a

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<sup>63</sup> Ibid..

natural method gives a woman or couple the understanding of what is happening naturally in the reproductive cycle and the techniques necessary for interpreting the changes the woman's body goes through.<sup>64</sup>

Instead of treating birth control as a practice that must necessarily disrupt their bodies' internal processes, they instead talk about natural birth control as a way to *live with* their bodies' processes, while still being able to choose whether or not to become pregnant.

Contrary to an extensive cultural narrative about the mysteriousness of the female body, the underlying premise of natural family planning — and the fertility consciousness that it can help create — is that women can easily know during which days of their menstrual cycle they are fertile by observing several reliable physiological symptoms produced by their bodies. Yet, ironically, the way that they perform this natural birth control is thoroughly scientific, by which I mean that it is dependent upon more than a century of practices, technologies, and knowledge that have developed out of established professional scientific and biomedical infrastructure. They focus on observable and quantifiable physiological symptoms; they use scientific information technologies and methodologies like charting, graphing, and statistical analysis; and they use scientific instruments like thermometers in order to perform it.

In this dissertation, I will refer to the women who perform natural family planning

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<sup>64</sup> Jackson, Leah, "Suggested Outline for Presenting the Ovulation Method", c. -1978 1977, Box 11, Folder 7, Women's Community Health Center Records, Schlesinger Library, Radcliffe Institute, Harvard University.



as fertility trackers.<sup>65</sup> While this is not a term that many would apply to themselves, it encompasses several elements of their practice that I would like to highlight. First, it centers our attention on their true object of concern. Instead of thinking primarily about “birth control,” which typically has been focused on stopping or neutralizing sperm, practitioners of natural family planning are primarily concerned with their own bodies and the changes in their fertility. Secondly, the epistemological basis of their practice is dependent upon their ritual recording of their physiological signs; emphasizing the consistent regularity of their monitoring and analysis seems apt.

Third, the term “fertility tracker” in current parlance is often used to refer to the software that women use to chart their physiological changes. By referring to the human actors involved in this practice by the same terminology used to refer to a computer program, I am foregrounding the ways in which twentieth- and twenty-first-century medical laborers have become inextricably linked in their practice and epistemology with the tools that they use to do their work.<sup>66</sup> For more than a century in our methods and in our consciousness, we have elided the human, the technological, and the natural.<sup>67</sup>

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<sup>65</sup> My terminology, while not an actor’s category, will also hopefully simplify matters when I am discussing what these women have in common, recognizing that such terminology might not always be a comfortable fit for the personalities involved and recognizing that internal debates have existed within communities about language, labeling, and inclusiveness. The scope of the project has made consistency and inclusiveness on this point difficult, and it is something I intend to pay close attention to still in revisions.

<sup>66</sup> My terminology developed, in part, due to the inspiration of another semantic shift between the human and the technological, although in that case the transition was from the person to the machine. In Jennifer S Light, “When Computers Were Women,” *Technology and Culture* (October 1999): 455–483., Light describes how the term “computers” transitioned from a description that applied to female technicians to one that described instead the machine that they were operating.

<sup>67</sup> This phenomenon will be more fully developed in chapter five, when I discuss the cybernetic nature of natural family planning and the new kind of subjectivity that it engenders.

## A Truth Truer Than a Poem

A century before a group of women met in Boston to discuss their bodies, Mary Putnam Jacobi submitted an essay for consideration for Harvard's Boylston Prize titled *The Question of Rest for Women During Menstruation*. Jacobi is known today as a pioneer for women's place in medicine both because of her position as an accomplished female physician in the late nineteenth century (she studied with Elizabeth Blackwell and earned her MD from the Women's Medical College of Pennsylvania) but also because of the content of her work. This essay in particular, published in 1876, was an exhaustive account of the history of medical theories of menstruation accompanied by Jacobi's own research and analysis.

While Jacobi's clear and explicit goal was to disprove the idea that menstruation was a debilitating condition for women, the way that she endeavored to do so was also a new way to think about the female body: she strove to use physiological *data* gathered by women to support her claims, which she then charted and statistically analyzed to prove her point. Given the controversial nature of her subject and her own position within the medical community, she submitted the essay anonymously, with only a Latin phrase as signature: *Veritas poemate verior*, “a truth truer than a poem.” It was Jacobi's belief that this kind of argument, based on a statistical analysis of information gathered using scientific instruments, would be more convincing than any based on morality.<sup>68</sup>

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<sup>68</sup> Carla Bittel, *Mary Putnam Jacobi and the Politics of Medicine in Nineteenth-Century America* (Chapel Hill, NC: University of North Carolina Press, 2009), 127.

Scientifically collected and observed data about the body was seen to be more truthful than the prevailing poetic vision of femininity. For Jacobi, and the generations of women who followed, physiological data was to become as truthful an expression of their bodies as their lived experience within it. Indeed, after decades of work, the two came to be indistinguishable.

### **The Work of Fertility Tracking in Action**

In their own words, women have turned to fertility tracking for a variety of reasons, all of which assume different kinds of responsibility for their bodies. Many women, like those discussed above, have a feminist approach; they believe that the best way to exercise personal bodily agency is to take a do-it-yourself attitude towards health care, and they prefer birth control methods that aren't made in a laboratory or controlled by professional gatekeepers. Some women have chosen fertility tracking due to health and safety concerns raised by IUDs, hormones, and irritating chemicals. Other women have religious objections to more common forms of birth control. Even before the 1968 papal encyclical *Humane Vitae* was released, which explicitly authorized “natural” methods as the only acceptable form of birth control for Catholics, religiously observant women of multiple faiths often depended on periodic abstinence to control their fecundity.<sup>69</sup> During the late-twentieth and early twenty-first centuries, women have often used fertility

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<sup>69</sup> The Boston Women's Health Birth Collective articulated these positions many times over and with varying degrees of vehemence, particularly about their relationship vis a vis a medical establishment that they viewed as oppressive and often actively working against them and their bodies. See “Introduction,” Box 98, Folder 3, Boston Women's Health Book Collective Records, Schlesinger Library, Radcliffe Institute, Harvard University.

tracking in conjunction with other assisted reproductive technologies in order to conceive their children.<sup>70</sup> Finally, there are many women who for medical or personal reasons simply prefer to use methods that they believe to be non-invasive, non-chemical, and “natural.”

Yet these natural means are predicated on one fundamental assumption, one that is rooted in a deeply scientific epistemology: that the internal mechanisms of the body are manifested in objective signs that can be observed, recorded, and analyzed using diagnostic tools. They are also predicated upon practitioners sharing a scientific understanding of those internal bodily processes. Suzannah Cooper, a certified fertility educator who also wrote about fertility awareness for several editions of the influential women's health manual *Our Bodies, Ourselves*, prepared a course guideline used by the Women's Community Health Center. In it, she described to women how changes in observable symptoms were “an accurate reflection of hormonal changes in the body, and can tell you a lot about what is happening in your cycle.”<sup>71</sup>

Two primary signs are generally charted by fertility trackers, although many have often chosen to focus on only one or the other.<sup>72</sup> The first is a woman's cervical mucus,

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<sup>70</sup> For a wonderful account of queer women's conception practices and, particularly, the ways they negotiate natural family planning techniques with more interventionist fertility clinic practices, see Laura Mamo, *Queering Reproduction: Achieving Pregnancy in the Age of Technoscience* (Durham, NC: Duke University Press, 2007). For a history of artificial insemination see Bridget Gurtler, “Synthetic Conception: Artificial Insemination and the Transformation of Family and Reproduction in 19th and 20th Century America,” Ph.D. diss, Rutgers University 2013.

<sup>71</sup> Cooper, Suzannah, “An OM/NFP Class Outline”, 1986, Box 11, Folder 10, Women's Community Health Center Records, Schlesinger Library, Radcliffe Institute, Harvard University.

<sup>72</sup> The reasons why women choose particular signs to follow are tied up in notions of bodily comfort and shame, notions of technological precision, and cultural norms about appropriate sexual behavior. They have also changed over time. These developments will be discussed in more detail in chapter five.

which acts as an indicator that ovulation has occurred and is a necessary component for making a woman's vagina hospitable for sperm. Women are encouraged to observe their cervical mucus directly using their fingers, and this component of natural family planning is often the most lauded for its direct connection between women and their bodies. Yet in their charting and analysis, women are taught to describe their cervical mucus in standardized language in order to better recognize patterns over time. They have also been encouraged to examine their cervical mucus under a microscope to discern the patterns in its underlying structure.

The second physical sign observed by fertility trackers is basal body temperature (BBT): a woman's temperature immediately upon waking in the morning. As Cooper explained, during a woman's menstrual cycle there are several different hormones being released at different times and in different amounts. In the early part of her cycle, estrogen is the predominant hormone circulating. At a point approximately midway through her cycle a luteinizing hormone is released. This is the event that triggers ovulation. Following ovulation, during the second half of her cycle progesterone becomes the dominant hormone released by her body. For a fertility tracker, her progesterone levels are the key. When her body begins releasing more progesterone, it causes a parallel spike in her body temperature, which then remains elevated until the end of her cycle. By keeping track of when this temperature shift happens, women are able to pinpoint the day of their ovulation — information which they can use to know during which days of their cycle they are able to conceive. (See Figure 1.2)

Technically, any sufficiently precise thermometer can be used to take a woman's basal body temperature. (Fertility educators agree that a tracker's thermometer should be at least as precise as one tenth of a degree.) What matters most is that she takes her BBT before rising from bed, drinking, eating, or doing any other activity that might interfere with her "base" temperature. But thermometers and ovaries are only two components of the technological system of natural family planning. Thermometers also included temperature charts, as well as instructions about how to use them. If the first thing that a fertility tracker does upon waking up is take her temperature, the second thing she does is inscribe that temperature on a chart. For much of the twentieth century, this charting had been done primarily by hand, either on a hand-drawn chart or on a printed chart purchased or photocopied from an instructional manual. In most cases the charts come pre-printed with a column of temperatures in one-tenth-of-one-degree increments, with one column of values for each day of a menstrual cycle. This way, a tracker can easily circle their temperature each morning, and then draw the graph of her temperature curve by simply connecting the dots.<sup>73</sup>

Once this data has been collected and inscribed, it needs to be interpreted. Women have established formal and informal communities around the practice of temperature charting, meeting in person at seminars and corresponding across long distances. Fertility courses have been offered by women's health groups, and numerous professional organization of fertility educators and researchers have met and published findings and

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<sup>73</sup> Ibid.

resources. Finally, many fertility trackers have written and published memoirs and instructional manuals to share what they have learned about the practice with other women.

But before we can continue investigating the natural family planning practices taking place at the turn of the twenty-first century, we first need to examine the origins of the technological system of fertility tracking, which must take us back again to Mary Putnam Jacobi's search for the truth about menstruation at Harvard and to Hannah Stone at the Birth Control Clinical Research Bureau at the turn of the nineteenth century.

## **Chapter Two**

### **Creating a Scientific Safe Period**

In 2013, Max Levchin introduced Glow, a new smartphone app designed to help women with infertility. Levchin, one of the co-founders of PayPal and other technology start-ups, claimed that “the [fertility] industry today is so ridiculously 15th Century.” In contrast, Levchin wanted to bring fertility into his vision of the 21st century, using big data and a slick smartphone app to “get women pregnant.”<sup>74</sup>

But Levchin’s presentation, which took place at the D: All Things Digital conference, was missing something crucial. He dismissed the fertility industry for not taking advantage of the latest in medical innovations, but failed to mention the scores of applications that have existed for decades to help women manage their fertility using smartphones, PalmPilots, and desktop computers. What’s more, by focusing on his own fertility technology, Levchin made decades’ worth of work and research invisible. Although one Glow spokesperson has reported that, for Levchin and Glow’s other founders, “fertility...seemed like it hit the sweet spot of an area we don't know much about,” professional scientists and ordinary women have been creating scientific

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<sup>74</sup> Lauren Goode, “Max Levchin’s Glow Fertility App: The Full D11 Session” Video Summary, D: All Things Digital conference website, <http://allthingsd.com/20130529/max-levchins-glow-fertility-app-the-full-session-video/>, May 29, 2013.



knowledge about menstruation and ovulation long before Levchin decided to bring his particular ideas about Big Data to the project.<sup>75</sup>

Scientists and engineers have repeatedly rediscovered fertility—in its aspect of human biochemistry—and many have staked their professional reputations and business success on controlling female fertility in some supposedly new way. (For a number of reasons – including widespread social conventions of thinking of fertility as a strictly feminine sphere – control of male fertility has never been nearly as prestigious or lucrative an area of research or innovation.)<sup>76</sup> Levchin’s contribution take advantage of new advancements in medicine and technology: in his words, “machine learning, predictive analytics, whatever you want to call it.” But his ability to characterize his contributions as new depends on the fact that others’ contributions are being ignored. The research and findings of both female scientists, non-professional women, and marginalized researchers has been ignored for nearly 150 years. At the core of modern fertility management is the question of determining not only when ovulation happens during women’s menstrual cycles, but also of determining how women can find out when they, specifically, are ovulating. What methods for determining individual fertility are functional and reliable? At the center of that discovery is the work of a groundbreaking

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<sup>75</sup> Ruthie Friedlander, “The Women’s Health App that Changed My Life: Glow,” *Elle*, January 27, 2014, accessed June 11, 2014, <http://www.elle.com/beauty/health-fitness/fertility-app-glow>.

<sup>76</sup> For more background on attempts to develop hormonal birth control for men, particularly as those attempts relate to social conventions regarding reproductive responsibility, see Nelly Oudshorn, *The Male Pill: A Biography of a Technology in the Making* (Durham, NC: Duke University Press, 2003).

female physician, the author of a censored Dutch sex manual, and the painstaking and harrowing work of unnumbered ordinary women at the turn of the 20th century.

### **Natural Family Planning**

Most contemporary smartphone fertility apps can be grouped under the heading of natural family planning, and its fundamental idea underpinning natural family planning is the existence of a predictable curve to a woman's basal body temperature—or temperature on waking in the morning. During the first part of a woman's menstrual cycle, her waking body temperature is lower than during the second part of her cycle. This temperature shift, of approximately half a degree Fahrenheit, is caused by the increased production of the hormone progesterone that occurs at ovulation. Thus the temperature shift, along with changes in a few other symptoms like cervical mucus and position, indicate that a woman is fertile.

Today, natural family planning methods are used by women who see themselves as a part of a data-driven and technological medical system. Their knowledge of ovulation, hormones, and reproduction is undoubtedly scientific. In the preface to Katie Singer's popular guide to natural family planning, *The Garden of Fertility*, the now-former president of the American College of Women's Health Physicians Justina Trott describes how natural family planning is easily commensurate with the knowledge and methods of the more official scientific establishment. Not only does natural family planning provide a woman with “an ideal avenue to connecting with her own body,” but

it also gives her “a vocabulary for communicating effectively with her health-care provider.”<sup>77</sup>

Naturally family planning teaches women how to ask the same physiological questions as their doctors and to use the same controlled medical language for describing them. A natural family planner quickly learns that a problematic menstrual cycle has many technical phases and complex components, and any one of them might be the root cause of her troubles. Learning how to discuss these in the same words as her doctor can streamline a doctor’s visit considerably.

At the same time, much of the popularity—and some of the credibility—of natural family planning lies in understanding it as “natural,” or as outside of the traditional medical establishment. Many women turn to natural family planning because it allows them a kind of direct access to their bodies, bypassing doctors and clinics entirely. They can detect ovulation, plan their pregnancies, and self-diagnose menstrual problems without visiting a lab, ingesting synthetic hormones, or relying on an external expert for help. The search for information about women’s fertility has been consistently dogged by this tension between the embodied knowledge of ordinary women, the academic knowledge of professional researchers, and the liminal researchers who, for reasons of gender and politics, may have their findings embraced by some and ignored by others. In this chapter, I will excavate for the first time in the historical literature the scientific linkage between basal body temperature and human ovulation. I will show how

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<sup>77</sup> Katie Singer, *The Garden of Fertility: A Guide to Charting Your Fertility Signal to Prevent or Achieve Pregnancy — Naturally — and to Gauge Your Reproductive Health* (New York: Avery Trade, 2004), 99.

this knowledge was created by figures with a tenuous relationship to the growing bureaucratic scientific establishment in the early twentieth century, and explore the role that natural family planning practitioners played in keeping the historical legacy and scientific knowledge of these liminal figures alive in their own memory.

### **Reproductive Science in the Early Twentieth Century**

During the early decades of the twentieth century professional research on the human reproductive system was conducted in uncertain territory. Researchers suffered from the stigma of the social taboos surrounding human sexuality. In response they often focused their attention on the more technical aspects of reproduction.

Warren Weaver spent decades directing Rockefeller Foundation funds for basic scientific research. In 1934, as head of the foundation's Natural Sciences Division, he argued that it was critical to discover the exact mechanisms behind the creation of human life. Given that human reproduction was, in his words, "pervasive," "highly important," and also "dangerous," it needed to be brought under the "rational control" of scientific experts.<sup>78</sup> During the early twentieth century, many leading scientists, policy makers, and social reformers were anxious about rates of national and international population growth. Although many were concerned about the general exploitation of natural

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<sup>78</sup> Adele Clarke, *Disciplining Reproduction: Modernity, American Life Sciences, and 'the Problems of Sex'* (Berkeley, CA: University of California Press, 1998), 4-5. Weaver's desire extended even further: "Can man acquire enough knowledge of his own vital processes so that we can hope to rationalize human behavior?"

resources, many more were concerned about the distribution of population growth among different socioeconomic and racial classes of Americans.<sup>79</sup>

It was hoped by many that with increasing knowledge of physiology would come an increasing ability to direct the nation's reproductive future, encouraging increased fecundity among wealthier, whiter Americans and decreased birth rates among racial minorities and others deemed less socially or biologically fit.<sup>80</sup> To soothe this anxiety and solve the population problem, women's bodies and reproductive systems were to be brought under scientific control, rendered fully predictable and controllable. Even if individual women were unruly and resistant to social conventions, at least their bodies – and the children they might make – could be managed.

In Weaver's conception of this problem, any individual woman's place was as research material, not active participant. The majority of early reproduction research was done in the laboratory, not in spaces where women might have felt on equal footing. Early researchers observed ovulation directly via animal research, while others took samples from women's vaginal canals and analyzed them under microscopes looking for evidence of ovulation. Others performed laparotomies on women, a surgery involving an incision through the abdomen, to detect ovulation directly. Even when women were recruited into the labor of such studies and actively recorded symptoms in diaries, or

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<sup>79</sup> See Daniel Kevles, *In the Name of Eugenics: Genetics and the Uses of Human Heredity* (Berkeley, CA: University of California Press, 1985); Mark Haller, *Eugenics: Hereditarian Attitudes in American Thought* (New Brunswick, NJ: Rutgers University Press, 1963).

<sup>80</sup> Also see Nancy Ordover, *American Eugenics: Race, Queer Anatomy, and the Science of Nationalism* (Minneapolis, MN: University of Minnesota Press, 2003) and Christine Rosen, *Preaching Eugenics: Religious Leaders and the American Eugenics Movement* (New York: Oxford University Press, 2004).

monitored and recorded their own temperature, sometimes for months at a time, their personhood and participation was hardly considered; the information they provided became subsumed into the study's data set and divorced from their own activity.<sup>81</sup>

In addition to these laboratory-based research approaches, fertility was understandably also a subject of immense popular attention. There was an early twentieth-century resurgence of interest in determining the existence of a rumored "safe period." The question was everywhere: was there a particular window during a woman's menstrual cycle during which she could not become pregnant? Was there only one window during which she could?

These debates were heavily influenced by the political climate of the time. As mentioned in the previous chapter, the Comstock laws had classified contraceptives as obscene material, making contraceptive products and even biological and physiological information difficult to transmit, which influenced both medical research and care. In this climate, both activists and physicians alike gave notions of the safe period short shrift. Some dismissed the idea because they did not think that a safe period existed, believing that disingenuous religious or political actors offered it as false hope to women in order to convince them to forgo other birth control methods. Others thought that even if it did exist, there was no reliable, scientific way to detect or predict it.<sup>82</sup> That began to change in the 1930s.

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<sup>81</sup> See Footnote 18-23 and 30 for discussion of studies that used such techniques.

<sup>82</sup> Abraham Stone Records, Countway Library, Harvard University.

Two unconnected but equally influential studies seeking the safe period were published in quick succession in 1932 and 1934. Austrian researcher Hermann Knauss and Japanese researcher Kyusaku Ogino independently published studies finding that the menstrual cycles of women followed predictable patterns that could be charted on a calendar.<sup>83</sup> They claimed that a woman's fertile period could be determined by counting the days between menstrual periods. (They claimed that ovulation occurred approximately 12-16 days before menstruation begins.) These two studies are the origins in the scientific literature for what most would describe today as the "rhythm method" of birth control.<sup>84</sup>

As a result, calendar-based methods skyrocketed in popularity and prominence during the 1930s and 1940s. They became immediately popular with Catholics and Catholic-organizations, and they also became incorporated into the set of services offered to women at the Birth Control Clinical Research Bureau, despite reticence from its medical director about its efficacy. Rhythm methods could, though, provide a service for women who were uncomfortable with other contraceptive methods, as well as provide political cover for the organization with religious figures.

The other constituency served by a surge in interest in the rhythm method was manufacturers who attempted to take advantage of a new market for birth control related

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<sup>83</sup> Hermann Knauss, *Periodic Fertility and Sterility in Woman: A Natural Method of Birth Control* (Chicago Medical Book Company, 1934).; Kyusaku Ogino, *Conception Period of Women* (Harrisburg, PA: Medical Arts Press, 1934).

<sup>84</sup> For more on the history of the rhythm method and other calendar-based methods of detrainning fertility, see Viterbo, "The Promise of Rhythm."

products. New companies and inventors applied for patents for a number of dial and slide-rule type devices that could help women more easily calculate and visualize their fertile periods. (Many also incorporated gestation calendars.)<sup>85</sup> The Atlantic Laboratories Conceptulator used a simple design that could be adjusted for different cycle lengths, and indicated fertile days and ovulation in red and black ink. (See Figure 2.1) Others, like the Rythmeter, were far more complicated. (See Figure 2.2) And although many at times incorporated iconography that connoted femininity, and womens' connection to the cycles of nature, they were also undeniably (and often intensely) quantitative and scientific in their approach. The "Scientific Prediction Dial" put that tendency right in its label, and no one could argue that "The Rule of Life" was not crafted in the image of a scientific instrument. In their design and, in the case of the device below, in their name, they explicitly evoked slide rules. (See Figure 2.3)

During the course of the 1930s, calendar-based methods were extensively tested against other methods of determining ovulation. Knauss and Ogino both published graphical calendars of women's cycles with the fertile period marked, and other researchers began to map additional kinds of daily data on top of their charts. This was often information gathered via vaginal smears, but in their attempt to discover as many patterns as possible many also began to chart more easily observable physiological signs like pulse and temperature.

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<sup>85</sup> The devices pictured here are held at the Countway Library, Harvard University.



## Lay History

This story – of Knauss and Ogino’s pathbreaking research, and a succeeding wave of additional data collection by professional researchers – is one familiar story for the origin of natural family planning, particularly for those more connected with Catholic traditions of early rhythm. Practitioners of natural family planning today, however, often do not see much kinship between their practices and the calendar-based methods devised and perpetuated by Knauss, Ogino, and the many researchers who followed in their wake. The women of the Boston Women’s Health Book Collective articulated their resistance to Knauss and Ogino’s work, which was based both on their convictions that they had a better knowledge of the science involved and on their understanding that women’s bodies could not be standardized in the particular way that rhythm method researchers described:

From this finding resulted the rhythm method, which uses the calendar—the date of previous periods—to determine infertile or ‘safe’ days. This method is not very effective and should not be used, because each cycle a woman has is unique. One can’t determine accurately from previous cycles when the next ovulation will occur, since ovulation occurs fourteen days before menstruation, not necessarily fourteen days after the last period.<sup>86</sup>

Instead, they see the origins of their practice in physiological research conducted nearly half a century earlier, when Mary Putnam Jacobi conducted investigated women’s physical state during the course of their menstrual cycles.

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<sup>86</sup> “Introduction,” Box 98, Folder 3, Birth control; fertility awareness, Boston Women’s Health Book Collective Records, Schlesinger Library, Harvard University.

I first encountered a practitioner's history on the popular fertility website FertilityFriend, an online location for sharing information about natural family planning, temperature tracking, and women's personal experiences learning about and using the method. The site hosts a number of resources, including videos and online lessons, downloadable charts, fertility software and smartphone apps, and forums where women can share their charts. In addition, FertilityFriend dedicates a portion of the site to recounting the history of temperature charting. This timeline connects the practices of daily temperature taking and recording to some of the first women on record as having done so.<sup>87</sup>

Their origin story begins in 1877, when Mary Putnam Jacobi published *The Question of Rest for Women during Menstruation*. Jacobi is known today as an early medical pioneer, one of the first women to rise to prominence in the profession. Jacobi was the first woman to study at the École de Médecine, and the second woman to become a member of the Medical Society of the County of New York. She served as a professor at the Woman's Medical College of New York and used her research to argue against prevailing views on the physiological inferiority of women.<sup>88</sup> *The Question of Rest* exhaustively recounts—and subsequently refutes—the many medical theories then surrounding menstruation.

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<sup>87</sup> "A brief history of fertility charting," FertilityFriend.com, <http://www.fertilityfriend.com/Faqs/A-brief-history-of-fertility-charting.html>.

<sup>88</sup> For an excellent and thorough account of Jacobi's life and career, including discussions of her continued groundbreaking activism, see Carla Bittel, *Mary Putnam Jacobi and the Politics of Medicine in Nineteenth-Century America* (Chapel Hill, NC: The University of North Carolina Press, 2009).

At the time when Jacobi was completing her training and beginning her career, it was still commonly believed that menstruation was an almost debilitating condition that required extensive rest and precluded women from many kinds of physical and mental exertion. These theories were often used as justification for why women should be kept out of demanding or strenuous professions. Such ideas were also predicated on the idea that women's bodies were designed, uniquely and primarily, for childbearing, and that any distraction from that goal would inevitably cause the woman herself great physical harm. For example, it was thought that if a woman spent too much time on academics or sports, her body's energy and vital forces would be diverted from her reproductive organs, causing them to deform or decay.

Jacobi had one clear goal with *The Question of Rest*: to thoroughly discount the idea that menstruation and fertility amounted a permanent state of disability for women, one which required the rest she questions in her title. In the process of collecting research about women's normal physiology and menstrual cycles, Jacobi also collected data that would lead to pinpointing the moment of ovulation in women.

Jacobi systematically refuted earlier theories of menstruation using a statistical survey of 268 women whom she asked to report on a number of physiological symptoms at various points during their cycles. She had them track symptoms like levels of tiredness, pain, general health, and activity levels. Jacobi combined these responses with more finely-grained diagnostic criteria: pulse, temperature (measured at four locations on the body), blood pressure, a measurement of muscular force that she labeled "dynamics,"

several qualities of their urine output, and two records of the weight a woman was able to lift.

In addition to proving that women experienced no significant menstrual debility according to these measures, Jacobi's research also discounts many prior physiological theories of menstruation, ovulation, and conception. In particular, Jacobi relocates the timing of ovulation to what she called the "intermenstrual period" (i.e. roughly midcycle between two menstrual periods). This claim was in direct contradiction to earlier theories, based on research done with dogs and other mammals, that ovulation and menstruation happened simultaneously. Additionally, Jacobi observed that a woman's temperature followed a regular pattern during her cycle, beginning lower immediately following menstruation and then rising to between 0.8°F and 1°F higher immediately before menstruation began again. The temperature shift, she discovered, occurred, along with ovulation, at some point during the intermenstrual period.

### **Practicing on the Margins**

Jacobi was a trained physician, but she was also a woman writing an analysis of women, using data collected by women, at a time when she and other women struggled to be recognized for their work as professional physicians. As such, obtaining recognition for her work was difficult. Harvard University awarded Jacobi the Boylston Prize for *The Question of Rest*, but in the decades that followed it garnered little attention from the medical profession. As of this writing, I have only discovered sporadic citations of

Jacobi's work on temperature and ovulation in English-language medical literature between the time of the book's publication and 1963, when Carl Hartman included her in his survey text on scientific research investigating human fertility.<sup>89</sup> The first, in 1897, was in a paper presented by Arthur Giles to the Obstetrical Society of London, which confirmed Jacobi's observations.<sup>90</sup> The second, in 1901, was written by Helen MacMurchy in *The Lancet* during her first year as the first female intern at Toronto General Hospital.<sup>91</sup> MacMurchy, who also did post-graduate work with William Osler, cited Jacobi's work as influential to the background of her own study of the relationship between women's menstrual cycles and temperature.<sup>92</sup> For her study, she sent temperature charts and lists of questions to hundreds of nurses and graduates of the Toronto General Hospital Training School for Nurses, the St. Michael's Hospital, the Women's medical College, as well as female physicians and school teachers throughout

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<sup>89</sup> Carl Hartman, *Science and the Safe Period: A Compendium of Human Reproduction* (Baltimore, MD: The Williams & Wilkins Company, 1962).

<sup>90</sup> Arthur E. Giles, "The Cyclical or Wave Theory of Menstruation, with Observations on the Variations in pulse and Temperature in Relation to Menstruation," *Transactions of the Obstetrical Society of London* (March 3, 1897).

<sup>91</sup> Helen MacMurchy, "Physiological Phenomena Preceding or Accompanying Menstruation, Together with Notes on The Normal Temperature of Women," *The Lancet* (October 5, 1901), 909-913. MacMurchy is now somewhat of an inauspicious figure in Canadian medical history for her commitment to a eugenical agenda during her tenure as Inspector of the Feeble-Minded between 1906 and 1919, particularly her advocacy of sterilization. For more on MacMurchy, her work, and her historical reception, see William H. Brown, "Making representation: Dr. Helen MacMurchy and the 'Feeble-minded' in Ontario, 1906-1919," Ph.D. diss., University of Toronto, 2005.

<sup>92</sup> MacMurchy was also interested in a number of other, more qualitative phenomenon surrounding menstruation that were not discussed in the medical literature, including "a tendency to pessimism... disturbances of the special senses... a great tendency to take cold...[and] a feeling that any work in hand must be all 'finished up'". There does appear to be a correlation between researchers who are interested in more subjective signs (like these above, as well as feelings of intermenstrual pain or *mittelschmerz*) and attendance to the relevance of Jacobi's ideas.

Toronto.<sup>93</sup> Her questionnaires dealt extensively with her participants mental states and other more subjective changes in their day-to-day experience, in addition to keeping note of more trackable symptoms like urine output and temperature. Her results confirmed Jacobi's, noting a marked increase in temperature during the inter-menstrual period.

Additional notes of Jacobi's work on temperature and ovulation are found in a general text on menstruation by Emil Novak<sup>94</sup> and in the work of Dorothy Smith Barton, who conducted a historical review of temperature and menstruation research for her thesis in neuro-anatomy at Yale.<sup>95</sup> Yet even this case, temperature was only of incidental concern to Barton. Her work was primarily interested in a connection between menstruation and "electrical potential," which was measured using a microvoltmeter at the finger-tips.<sup>96</sup> (Here Jacobi's work seems to be cited out of an excess of historical thoroughness, and not because it was influential to the proceedings of her research.)

Where Jacobi's *The Question of Rest* did, however, prove successful and influential was with the public. It was released by trade publishers, which may have allowed Jacobi's work to be taken up by nonprofessional or somewhat marginal scientific

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<sup>93</sup> MacMurchy, 909.

<sup>94</sup> Emil Novak, *Menstruation and its Disorders* (New York: D. Appleton and Company, 1921).

<sup>95</sup> Dorothy Smith Barton, "A Study of Temperature and Electric Potentials in the Menstrual Cycle," *Yale Journal of Biology and Medicine* 12, No. 5 (May 1940).

<sup>96</sup> This attempt was part of a larger body of research instigated by the rush of excitement over electricity's medical possibilities, particularly in the wake of the introduction of the EEG to examine brain waves. There were a multitude of studies designed to identify electrical changes in women's bodies in connection with menstruation, and many thought electricity might prove to be the vital force behind it all. For an overview of electricity's powerful place in the medical imagination between 1850 and 1950, see for example, Carolyn Thomas de la Pena, *The Body Electric: How Strange Machines Built the Modern American* (New York: New York University Press, 2003) and Iwan Rhys Morus, *Frankenstein's Children* (Princeton, NJ: Princeton University Press, 1998).

figures. Jacobi's work later informed the physiological research conducted by Dutch physician Dr. Th. H. Van de Velde.<sup>97</sup> Van de Velde is occasionally credited in medical literature as the first person to explicitly map ovulation onto the temperature shift at ovulation. But during his lifetime, Van de Velde was also a marginal figure, particularly to the emerging American medical and scientific establishment.

Van de Velde's key work on ovulation science, based on research conducted while he served as the Director at the Gynaecological Institute in Haarlem, Netherlands, appears in his book *Ideal Marriage: Its Physiology and Techniques*. *Ideal Marriage* was published in Dutch and German in 1926 and translated into English in 1930.<sup>98</sup> The book quickly became notorious for its explicit content; the physiology and techniques of its title were equal parts biology lesson and vigorous sexual manual. This brought the text into direct conflict with American authorities and the Comstock Act that still governed "obscene" material, and in many of its printings the book's dust jacket was printed with various disclaimers. One emphasized that it was written "especially for use by the medical profession, sociologists and all engaged in scientific or welfare work." Another claimed that it was a book specifically for doctors to give to their patients. This was also the claim made by a *Time* magazine review of the book published in 1931: "This book is

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<sup>97</sup> Th. H. van de Velde, *Ideal Marriage: Its Physiology and Technique*, Stella Brown, trans. (New York: Random House, 1930). Van de Velde cited Jacobi's work prominently.

<sup>98</sup> Vern Bullough also discusses van de Velde briefly, but in the context of his recommendations concerning physical acts of sexual intercourse without much discussion of his scientific research. (Indeed, Bullough actually dismisses van de Velde's research as being factually inaccurate.) Vern L. Bullough, *Science in the Bedroom: A History of Sex Research* (New York: Basic Books, 1994).

too risky, culturally, for general distribution. Only doctors, lawyers, ministers, social workers and educators may buy it.”<sup>99</sup>

The book’s reputation had a tendency to precede it; individuals and physicians wrote to New York City’s Birth Control Clinical Research Bureau, for example, trying to obtain copies, but even the professional activists had trouble obtaining copies through the mail.<sup>100</sup> But despite the accusations of obscenity, Van de Velde claimed that his book was simply meant to be given by doctors to their patients to encourage happy and healthy marriages. The original edition was reprinted in the United States at least once a year between 1930 and 1957, though women often complained often in the early years that they could not obtain a copy. Eventually, *Ideal Marriage* would become the most popular marriage manual in the United States.<sup>101</sup>

Like Jacobi, Van de Velde collected an array of data, from blood pressure and pulse to temperature and urine output. He then took the additional step of charting those signs graphically, rather than simply in tables as Jacobi had done. His key chart graphs a woman’s temperature during the course of the days of her cycle, while simultaneously also mapping other factors including mucus production, breast tissue swelling, and the

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<sup>99</sup> “Connubial Hygiene,” *Time* 17, No 19 (May 11, 1931), 42.

<sup>100</sup> Abraham Stone Papers, Countway Library, Harvard University.

<sup>101</sup> Bullough, *Science in the Bedroom*. Van de Velde was even influential upon the famous sex therapist Dr. Ruth Westheimer, who described in 1993 how she encountered real knowledge about sex for the first time: “Though I wasn’t yet 10 years old, I knew that my parents had a book that I wasn’t supposed to look at. It was called ‘Ideal Marriage’...my parents kept it high up in the closet, locked behind a glass door, but I knew where the key was and one day I put a chair on top of a chair, crawled up, took out the book and furtively read a few pages.” “The Forbidden Books of Youth,” *New York Times* (June 6, 1993), BR13, 26, 28.



quality of cervical mucus. On this chart, an independently determined occurrence of ovulation is marked with a bright yellow circle, just at the moment when the temperature line begins to rise.<sup>102</sup> (See Figure 2.4)

The chart, though originally published in 1926, shows remarkable consistency in both visual style and in the type of information portrayed with the charts that are used by natural family planners today. It is quite easy to see how twenty-first-century natural family planners would see their own origins in the work of Jacobi and Van de Velde. Their work, while clearly scientifically significant, was also published by popular presses, widely reviewed, and continually available for much of the twentieth century.<sup>103</sup>

## Lay Practice

Just as device manufacturers jumped at the chance to create instruments of a sort to accompany Knauss and Ogino's calendar rhythm methods, so did they move to fill the void in the market for tools to accompany basal body temperature tracking. Since midcentury, specifically-branded basal body temperature thermometers have been a fixture on the market. In 1949, Linacre Laboratories filed for a trademark for their Ovulindex brand of thermometer, designed specifically to measure basal body temperature. Manufactured at least through the 1970s, this "woman's thermometer," as it was branded, came packaged with extensive instructional materials about not only how to

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<sup>102</sup> Van de Velde, *Ideal Marriage*, Plate V.

<sup>103</sup> As mentioned previously, *Ideal Marriage* remained in print in the United States until the 1960s; as late as 1966 full page ads for the book were still being run in the New York Times, and the book was issued with increasingly less professional covers. *New York Times* (September 256, 1966), 377.

use and safely care for the thermometer itself but also about fertility tracking in general. It also included information about women's bodies, like descriptions and diagrams of the female reproductive system. The enclosed handbook stressed the importance of this information by claiming that a woman must know how her ovaries worked in order to use her thermometer correctly (a slightly strange and circular prescription, given that it was the thermometer that was going to tell her what her ovaries were doing).<sup>104</sup>

In addition to Van de Velde's *Ideal Manual*, which was equal parts dry science and somewhat salacious coverage of sexual positions, other manuals for marriage were published that discussed the science in slightly more accessible detail. In *Successful Marriage*, an edited volume published by Doubleday in 1947, an assortment of public health, sociology, home economic, family planning, and medical experts contributed essays, and Edward Davis, a professor of obstetrics and gynecology at the University of Chicago, covered temperature tracking to detect the fertile period.<sup>105</sup> In his essay, Davis included three months of completed temperature charts of a patient who was attempting to conceive.<sup>106</sup> Her temperature charts indicated that her ovulation timing was

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<sup>104</sup> *Thermometer Collection*, n.d., Artifact Collection, Dittrick Medical History Center.

<sup>105</sup> Edward Davis, "Factors Favoring Fertility," in Morris Fishbein and Ernest Burgess, eds., *Successful Marriage: An Authoritative Guide to Problems Related to Marriage from the Beginning of Sexual Attraction to Matrimony and the Successful Bearing of a Family* (Garden City, NJ: Doubleday & Company, 1947).

<sup>106</sup> One thing of the most striking elements in discussions of this subject is the unconscious slippage of technical language and metaphor that reveals the conceptual and historical connections between epistemologies and practice. For instance, Davis reminded his readers, "It is well to remember that temperature is a sensitive barometer and that any unusual excitement, nervousness, or unusual occurrences may influence an otherwise normal curve." In this instance the barometer serves as a metaphor to describe an actual thermometer, hilariously, given the extent to which barometers and thermometers are otherwise rolled together in discussions of meteorology or, as I will show in the next chapter, discussions of health in the domestic environment.

exceedingly irregular (making her an exceptionally poor candidate for calendrically-oriented methods of determining fertility), but a temperature spike was still occasionally detectable. After working with Davis and minding her charts, she eventually conceived.<sup>107</sup>

As these fertility tracking practices proliferated through certain channels, if not others, fertility trackers have been dedicated in not losing the legacy of Mary Putnam Jacobi's work. The fertility tracking website where I first encountered her name is only the latest in a series of mentions of her by the women engaged in fertility tracking. Perhaps not surprisingly, Jacobi was present as a figurehead for the women involved in the Boston-area fertility tracking community of the 1970s discussed in the previous chapter. For them, Jacobi and her research represented the long history of the knowledge that they were using, and a connection to a form of legitimacy that, despite the research detailed above, was still lacking for both the science and for the fertility trackers who were using it. At a 1978 conference on the Billings method of fertility awareness, one presenter explicitly drew connections to Jacobi's work from exactly one century ago.<sup>108</sup> Women writing in feminist publications in the 1970s and 1980s also invoked Jacobi, as Ricki Skolnik did in an article on natural birth control in the *Whole Life Times*.<sup>109</sup>

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<sup>107</sup> Ibid., 249, Figure 6.

<sup>108</sup> Unattributed attendee notes on presentation by Brennan, Billings Ovulation Conference, June 23, 1978, Boston Women's Health Book Collective Records, Schlesinger Library, Radcliffe Institute, Harvard University. The Billings method of fertility awareness focused primarily on the qualities of cervical mucus, however it was often combined by users with sympto-thermal methods.

<sup>109</sup> Ricki Skolnik, "Natural Birth Control," *Whole Life Times*, Issue 25 (March 1983), 24-26.

And still one presenter at the 1978 conference remarked, “the big thing we need now is academic acceptance.”<sup>110</sup> This quote illustrates just how fitfully knowledge, practice, and reputations of expertise proliferated around this issue. Basal body temperature tracking slowly accumulated supporters in academic research and clinical practice over the course of decades, but this limited acceptance did not translate into acceptance of fertility tracking practices generally, especially those that did not occur under the direction of medical professionals like Davis. In response to this lack of support, women turned instead to each other. One attendee of the 1978 conference noted, “Couples need to live with our bodies, not rely on technology out there. [We’re] not happy with pills and condoms, [and there is a ] whole world out there looking in another direction.”<sup>111</sup>

### **Professional Resistance**

Despite the work of Jacobi and Van de Velde, researchers in the reproductive sciences often remained skeptical about the reliability of the connection between temperature and ovulation. It took a preponderance of studies published in professional journals during the first few decades of the twentieth century until the scientific connection between BBT and ovulation was well established and had reached consensus. In many of these studies, the women whose bodies were being investigated were

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<sup>110</sup> Attendee notes, Billings Ovulation Conference, June 23, 1978.

<sup>111</sup> Ibid.

explicitly enrolled in the process of keeping diaries of their symptoms, recording their own temperatures, and remitting themselves for extensive and invasive testing. Their role is often glossed over by researchers or only mentioned obliquely, though their direct words are occasionally used in discussion.<sup>112</sup>

Skepticism about these findings was most acutely felt by America's prominent birth control activists during the 1930s and 1940s, including Margaret Sanger and Dr. Hannah Stone. Together they ran New York City's influential Birth Control Clinical Research Bureau, where they both gathered data for research and worked daily helping the women who visited make reproductive decisions. The pair also arranged a legal test case against the Comstock Act's associated laws in 1936, when Stone imported 120 Japanese pessaries that were seized by customs. In addition to her activist and clinical work, Stone was also a productive and pioneering researcher, publishing the first study of a contraceptive technique to appear in a medical journal in 1928.

Given the political and religious climate of the time, Sanger was a vocal critic of any birth control method that required periodic abstinence: not only was she not in favor of methods that required stiff self control and cooperation by both men and women, she

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<sup>112</sup> See, for a few key examples, Theodore Zuck, "Relation of Basal Body Temperature to Fertility and Sterility in Women," *American Journal of Obstetrics and Gynecology* 36 (December 1938), 998-1005; Purvis L. Martin, "Detection of Ovulation by the Basal Temperature Curve with Correlating Endometrial Studies," *American Journal of Obstetrics and Gynecology* 46 (1943), 53-62; Pendleton Tompkins, "The Use of Basal Temperature Graphs in Determining the Date of Ovulation," *Journal of the American Medical Association* 124, No 11 (March 11 1944), 698-700. Prior to Jacobi's study, temperature in pregnant and puerperal women had been examined by William Squire, *Puerperal Temperatures*, Transactions of the Obstetrical Society of London 9 (1868), 129-144. And as late as 1956, Edmond Farris of the The Wistar Institute of Anatomy and Biology published findings that contradicted the usefulness of BBT as an indicator of ovulation. Edmond Farris, *Human Ovulation and Fertility* (Philadelphia: J. B. Lippincott Company, 1956).

was skeptical of the existence of a safe period at all. Norman Himes, a sociologist and the author of *Medical History of Contraception*, which was reprinted in numerous editions for decades, wrote that even if the safe period “ballyhoo” turned out to have a physiological basis, it was nevertheless “futile and impracticable” as “the careless and dull-witted will never have the self-discipline to follow” it.<sup>113</sup> Stone, although herself critical of safe period, nevertheless helped women put Knauss and Ogino’s ideas into practice, teaching women how to chart and interpret their menstrual calendars. She worked with many women in the clinic who wanted to try calendar-based methods for religious reasons, since periodic abstinence was the only birth control method approved by the Vatican for Catholic couples.<sup>114</sup>

During the same month that Stone’s legal test case was being tried by the Second Circuit Court of Appeals, Stone also attended a professional conference on contraception research and clinical practice being held in New York. Carl G. Hartman, another towering figure in the study of contraception, spoke at the conference about research surrounding the safe period, including the discoveries by Knauss and Ogino on calendar-based methods. During Hartman’s session, Stone spoke up about a new method for determining the safe period that had recently come to her attention. This method used variations in a woman’s daily temperature to pinpoint the day of her ovulation. This new

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<sup>113</sup> Norman Himes, “Some Inferences from History,” *Birth Control Review* 4, No 3 (November 1936).

<sup>114</sup> However, after extensive analysis of the charts provided by her patients, Stone eventually concluded based on her research that the any method that was solely calendar based was insufficiently flexible to accommodate even women who self-reported as having “regular” menstrual cycles; even they often had cycles that varied by multiple days each month, which was sufficient enough variation to disrupt calendar-based methods, and some of her patients ended up conceiving.

technique was unfamiliar not just to Stone, but to the rest of the conference attendees as well. How had she heard about it? Ordinary women, looking to the Bureau for information, had written to ask for more information on what they called the temperature method.<sup>115</sup>

Stone and her colleagues initially dismissed the idea of determining the safe period using a woman's temperature; early, small-scale attempts to investigate did not find a correlation, and the Birth Control Clinical Research Bureau staff moved on.<sup>116</sup> But over the next few decades, Stone, Hartman, and other researchers slowly began to study the relationship between temperature and ovulation. With each passing study, more evidence amassed that, for many women, body temperature was a reliable indicator of ovulation and their own fertility. Yet even as this knowledge of the physiology involved developed, disapproval shifted subtly from a disbelief in a scientific connection to a more firm distrust that women might be able to operationalize it effectively. Despite the fact that over the next half century natural family planning practices would become fully embraced by certain communities of women, that distrust still lingered, and it is visible in much of the rhetoric used in the twenty-first century by technology developers like Max Levchin. For them, technology has become the solution to solve women's unreliability in properly following the methods of fertility tracking.

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<sup>115</sup> Carl Hartman, "Facts and Fallacies of the Safe Period," *Journal of Contraception* 2 (No. 3), March 1937, 51-61.

<sup>116</sup> Ibid.

## **The Legacy in Glow**

Women who might have consulted with Hannah Stone a century ago now turn to their physicians, fertility, specialists, internet message boards full of other women, desktop software, and smartphone apps. And just as the scientific knowledge surrounding the temperature shift at ovulation had been discovered and operationalized by women well before the existing scientific establishment began to substantiate their claims, the newest generation of smartphone apps — like Levchin’s Glow — also take advantage of decades of practice both on paper and digitally, incorporating their methods, symbology, and community-specific vocabulary.

Glow has gone farther than many other apps in incorporating the fertility tracking community’s common acronyms. In addition to shorthand that is popular in the professional literature, such as shortening basal body temperature to BBT, Glow uses many other common acronyms such as TTC (Trying to Conceive), DPO (Days Past Ovulation), CM and EWCM (Cervical Mucus and Egg White Cervical Mucus). These acronyms are used throughout the app, and they are explained in Glow’s Frequently Asked Questions website.

In addition to building on the communications and methodological infrastructure that communities of women have already established, Glow takes an even more ambitious step in utilizing the labor of its users as a resource in its own development. Accompanying the smartphone app, Levchin and his partners have launched Glow First and Glow Enterprise. Glow First, organized as a non-profit, works as a cost-sharing



program into which women make ten months worth of payments; if they become pregnant using Glow in that time, their funds are pledged to women who can not afford the service, and if they don't become pregnant, their funds can be used to reimburse medical care they seek further for their infertility. Glow First also acts as a perk that employers can provide their employees through Glow Enterprise, taking advantage of a general trend in health and wellness programs that employers hope will lower health insurance costs over all.<sup>117</sup>

Levchin is quoted in a Fortune article describing the benefits of Glow for employers not in terms of health and wellness, however, but in terms again of the modernity of his enterprise. "The employers get to look pretty bad-ass," he claims, "because they are self-declared extremely progressive."<sup>118</sup> But like so many technology companies trading on a nebulous idea of innovation, Glow's business model is one that depends utterly on the labor of its users. In addition to helping individual women become pregnant, Glow has a major goal in collecting an extensive, granular data set from users that they can use to assess risk and provide more optimally priced insurance services. In its initial push to increase use of the app and to encourage consistent data entry practices, Glow has also partnered with two fertility clinics (one in Washington and one in San Francisco) that will encourage sign-ups.<sup>119</sup>

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<sup>117</sup> April Dembosky, "PayPal co-founder finds fertile ground for growth with Glow app," Financial Times, August 8, 2013, accessed August 12, 2013, <http://www.ft.com/intl/cms/s/0/e6107/fea-0011-11e3-ba6b-00144feab7de.html>

<sup>118</sup> Jessi Hempel, "Max Levchin brings Glow to the workplace," Fortune, February 20, 2014, accessed June 10, 2014, <http://fortune.com/2014/02/20/max-levchin-brings-glow-to-the-workplace/>

<sup>119</sup> Dembosky, np.

In January 2014, when Glow released its third major software update, it officially expanded its scope to include essentially all areas of women's health in a bid to increase the breadth and usefulness of its data pool. This Glow has also increased the range of potential health problems it might suggest users ask their doctor's about. (Glow's founders are always quick to point out that Glow does not diagnose, but merely provides recommendations.)<sup>120</sup> Where they are on more confident ground scientifically is in their use of user data for research; Dr. Philip Chenette, one of Glow's medical advisors, and Christ Martinez, one of Glow's data scientists, will present the first research paper based on Glow's data set at the annual meeting of the American Society for Reproductive Medicine in October 2014.<sup>121</sup>

Despite the revolutionary rhetoric of Glow's founders, even in this model of uncompensated labor, Glow is far from unique or cutting edge. Indeed, just as Glow has built its first functions — determining ovulation — with the research and experimentation of unacknowledged women and marginal professionals, so too does it seek to build its primary profit-generating function — its insurance programs — using data collected and provided by users that are not only uncompensated, but actually pay for the privilege.

Levchin and his team repeatedly claim that they want to revolutionize the American health care system, using methods that they describe as some combination of “revolutionary,” “progressive,” “innovative,” and “bad-ass.” This chapter described the

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<sup>120</sup> Hempel, np.

<sup>121</sup> Preetisha Sen, “How Max Levchin's Glow app got 25,000 women pregnant,” *Fortune* (August 27, 2014), <http://fortune.com/2014/08/27/how-max-levchins-glow-app-got-25000-women-pregnant/>.

nineteenth and early-twentieth century origins of their scientific resources; the following chapter will describe the century-long history of their data collection practices, which began in the 1870s when physicians began using the uncompensated labor of mothers to collect data about their patient's health.

## Chapter Three

### **Enrolling Mothers as Reliable Medical Workers: The Thermometer in Turn-of-the-Century Domestic Medicine**

During the 1870s and 1880s, clinical thermometers were simultaneously entering American hospitals and American homes. Just as physicians began — often reluctantly — incorporating the thermometer into the rhythms of their work, patients also became fascinated by their doctor’s new glass tool. Although atmospheric thermometers were certainly not a novel technology to nineteenth-century Americans, medical thermometers were.<sup>122</sup> In order for a physician or a lay person to use a thermometer to diagnose health or disease in the body, first and foremost, that person must believe that a thermometer is able to provide information that could be useful in answering this question. So far in this dissertation, we have encountered late nineteenth and early twentieth-century researchers (both professional and lay) who turned to the thermometer as a new way to discover the secrets of women’s bodies. But how did the thermometer come to be in their hands at all? How did physicians and their patients both come to look to the thermometer to translate the truth of their bodies’ experiences into terms that could be universally understand?

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<sup>122</sup> For a general history of thermometers, particularly as they pertain to atmospheric phenomena, see W. E. Knowles Middleton, *A History of the Thermometer and its uses in Meteorology* (Boston: Johns Hopkins University Press, 1966).

As recently as the early nineteenth century, neither a physician or a patient would have viewed a patient's numerical temperature as a particularly useful piece of information. During the nineteenth century the science of medicine was changing profoundly. Much of what marks twentieth and twenty-first century medical practices as scientific in the public imagination is the use of instruments of quantification: tools like thermometers and blood pressure cuffs, or urinalysis and blood testing. These tools are often understood by their users primarily as translators, transliterating the fleshy experience of the body into a language that instruments and human beings can understand. But as such instruments supposedly distill the body into quantified form they are part of a project far more transformative than translation; indeed, the numerical quantity of a fever, for example, is a new creation, an actor in the world that is built by, and enables, different kinds of relationships between individuals, their bodies, and the instrument that quantifies them.

As Theodore Porter has pointed out, one of the ways in which quantities behave differently in the world is through their ability to smooth communication between many different actors, often at great distance.<sup>123</sup> The thermometer and its temperature readings, as they moved between hospitals and home, exemplify this trend. Despite deep divisions between physicians about the thermometer's usefulness, tension between physicians and patients about the proper role of the thermometer in diagnosis and treatment, and technological hurdles like inconsistent calibration, the thermometer nevertheless became

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<sup>123</sup> Theodore Porter, *Trust in Numbers* (Princeton, N.J.: Princeton University Press, 1996).

a crucial tool in the interactions between doctors and patients. After decades of intense turmoil, a stable technological system emerged that, in the process of correcting for the unreliability of both thermometers and their lay users, enabled the labor network of new medical practices to extend dramatically. Not only would thermometers provide physicians with a new avenue for diagnosis and treatment, I will argue that instruments became a tool for managing the relationship between patient and physicians.

Thermometers would come to manage growing conflicts between patients, caregivers, and physicians by structuring their relationship into one based upon a hierarchy of expertise, as well as grant patients and caregivers new access to the language, methods, and epistemic changes of turn-of-the-century medicine.

### **Making Thermometry Convincing**

Medical science has not always dealt in quantifications. Historian of medicine John Harley Warner describes the transformation in medical epistemology that took place during the nineteenth century:

Between the 1820s and the 1880s medical therapeutics in America was fundamentally altered. Traditional medical practices, founded on assumptions about disease shared by doctor and patient and oriented toward visibly altering the symptoms of sick individuals, began to be supplanted by strategies founded in

experimental science that objectified disease while minimizing differences among patients.<sup>124</sup>

The epistemological changes underpinning these changing practices were, as he puts it, “true revolutions” in medicine, dramatic changes in ways of knowing the body that were themselves functionally linked to the ascendancy of the medical profession.

As physicians sought to establish a new kind of expertise, they turned toward a European movement in medicine that privileged empirical ways of knowing, building new claims to expert knowledge based in the science of empiricism and, more specifically, the quantitative specificity that empiricism required.<sup>125</sup> By 1891, when S. Weir Mitchell gave his president’s address before the Second Congress of American Physicians and Surgeons, he chose as his topic the “early history of instrumental precision.”<sup>126</sup> This history, which recounted the changes of the previous decades in medical practice, was intended both to educate his audience of young physicians about the prior medical era from which they had emerged and to provide them with a steadying guidepost in their practice in the face of the “swift social changes of this age and country.” As the young physicians of the future, they would be on the front lines for all

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<sup>124</sup> John Harley Warner, *The Therapeutic Perspective: Medical Practice, Knowledge, and Identity in America, 1820-1885* (Princeton, NJ: Princeton University Press, 1997), 1.

<sup>125</sup> For a discussion of a technology similar to the thermometer that was also associated with childcare, see Lawrence Weaver, “Weighing Babies and the Birth of the Infant Welfare Clinic,” *Bulletin of the History of Medicine* 84, No 1 (Spring 2010), 30-57, for a discussion of the introduction of numerical and graphical methods in institutional childcare.

<sup>126</sup> Silas Weir Mitchell, “The Early History of Instrumental Precision in Medicine: An Address Before the Second Congress of American Physicians and Surgeons,” September 23rd, 1891 (New Haven: Tuttle, Morehouse & Taylor, 1892).

of the “novel problems” of the future. In Mitchell’s view, new medical technologies — with their more exacting standards of precision — could be counted on to help the physician face the “bewildering spectacle” of their future patients.<sup>127</sup> Included in this bewildering spectacle were the many American women becoming “influenced by masculine education” and accepting “male standards of work and capacity.”<sup>128</sup>

Mitchell was emphatically clear that such devices would not save the physician labour; their purpose was to make him more exacting and precise in his own evaluations. Although to some of his contemporaries using such tools as thermometers might have seemed a relatively simple mechanistic process,<sup>129</sup> he did not want them to overlook the history and the transformative effects of such instruments on their practices and, even, their highly honed intuition:

As in factories more and more exact machines have trained to like exactness a generation of workmen, so with us, the use of instruments of precision, rendering the comparison of individual labor possible, has tended to lift the general level of acuteness of observation. The instrument trains the man; it exacts accuracy and teaches care; it creates a wholesome appetite for precision which, at last, becomes habitual. The microscope, the balance, the thermometer, the chronograph have given birth to new standards in observation, by which we live, scarce conscious of the change a generation has brought about. Certain interesting intellectual results

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<sup>127</sup> Ibid, 24.

<sup>128</sup> Ibid, 7.

<sup>129</sup> Ibid, 24.



have everywhere followed the generalization of precision by the use of instruments, like the world-wide lesson in punctuality taught by the railway and made possible by the watch. We have so often timed the pulse that most of us can guess its rate, and constant use of the thermometer enables one to trust better one's own sense of heat, as the hand appreciates it.<sup>130</sup>

Mitchell highlighted two qualities that would be crucial to the shape of thermometry in the century to come. First, as he put quite plainly, “the instrument trains the man.” Although he likely would not have expressed it in this way, he recognized that through the repetitive use of the instrument, the values of the instrument would unavoidably become the values of its user.<sup>131</sup> Physicians would grow to appreciate the subtle influence that repeated use would make on a physician’s techniques as well as on which physiological symptoms he privileged. Second, Mitchell identified the standardizing function that is recognized as the hallmark of quantification; such technologies “render[ed] the comparison of individual labor possible.”<sup>132</sup> Quantified temperatures, for example, were quickly becoming a touchstone within the hospital setting, a figure around which an extensive network of staff could operate. Recorded on similarly standardized charts, they enabled multiple physicians and nurses to check in on the status and progress of a patient without the possibility of miscommunication

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<sup>130</sup> Ibid., 8.

<sup>131</sup> Langdon Winner, “Do Artifacts Have Politics?” *Daedalus* 109, no. 1 (Winter 1980): 121–136.

<sup>132</sup> Ibid., 8.

introduced by more qualitative, supposedly suggestive descriptions.<sup>133</sup> (Of course, as we will see later, these quantities were often not as self-evident and uniform as they appeared.)

But Mitchell's coupling of the rise of the medical profession with its new instrumental expertise makes it easy to overlook the fact that not all professionals welcomed this instrumental retraining. Nor were physicians the only ones interested in these new tools; and the interest of others —namely, their patients — was of great concern.<sup>134</sup>

In the medical literature of the late nineteenth century, debates about the imposition of the thermometer into clinical practice, as well as the epistemic weightiness with which patients regarded it, were common. Historian of medical technology Stanley Reiser briefly identifies the phenomenon of the thermometer-demanding patient, citing the frustrations of Dr. C. G. Hollister. While he was treating a young female patient, her mother demanded the use of the “little glass thing” on her daughter. The mother had learned from a friend that there was a device that could “tell just where the disease was,

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<sup>133</sup> Joel D. Howell, *Technology in the Hospital: Transforming Patient Care in the Early Twentieth Century* (Baltimore, MD: Johns Hopkins University Press, 1996). Howell addresses this phenomenon with respect to multiple transformative technologies that attempt to standardize patients in hospitals at the turn of the century, including urinalysis, x-rays, blood tests, and the medical charts upon which this data was recorded.

<sup>134</sup> Physicians were also resistant to a great number of the new instruments of precision. For more about the struggle over the introduction of blood pressure reading devices, see, for example Hughes Evans, “Losing Touch: The Controversy over the Introduction of the Blood Pressure Instruments into Medicine,” *Technology and Culture* 34, no. 4 (October 1993), 784-807 and Joel Howell, “Early Perceptions of the Electrocardiogram: From Arrhythmia to Infarction,” *Bulletin of the History of Medicine* 58 (1984),

entirely,” and she was not about to be satisfied with the physician if he did not use it.<sup>135</sup> Hollister expressed his frustration: “The friends and even the patient, while they know little or nothing as to the variations of temperature, not even the normal temperature of the human body...demand to know the daily rise and fall, commenting upon each.” Not only was this a problem of distraction for the patient, but it was a problem of credibility for the physician; regardless of the physician’s feelings, patients might dismiss a doctor who failed to use the thermometer as poorly trained or not credible. Another physician, a Dr. Mercier, even presented a new thermometer to the Zurich Medical Society that attempted to bypass a patient’s numerical curiosity. Mercier’s thermometer consisted of a typical thermometer tube, but was printed without any numerical scale at all. Only once it was combined with a specialized outer case could the temperature be read; in this way the physician could keep “inquisitive patients...ignorant of their thermic condition.”<sup>136</sup>

Even professor of medicine Dr. Hugo Engel, who encouraged physicians to take up the clinical thermometer in their practice, did so not solely for its diagnostic efficacy. Writing in the *Medical and Surgical Reporter* in 1882 he reported that not only was the thermometer uniquely able to lend rapidity to physicians’ diagnoses, but the presence and use of the diagnostic instrument was also able to provide a “better impression upon the public” than the physician who “simply looks at the patient and the tongue, feels the

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<sup>135</sup> C. G. Hollister, “A Few Thoughts on the Clinical Thermometer,” *Medical and Surgical Reporter* 54, 19 (May 8, 1886): 602, 602 cited in Stanley Joel Reiser, *Medicine and the Reign of Technology* (Cambridge, UK: Cambridge University Press, 1981).

<sup>136</sup> “A New Thermometer,” *Medical Record* (October 3, 1896), “Body Temperature” collection, Dittrick Medical History Center.

pulse, and asks a few questions.”<sup>137</sup> Physicians were understandably apprehensive and defensive of this denigration of the physicians’ sight, touch, and verbal questioning; their previous authority was to a large extent grounded in the expertise of their evaluations.<sup>138</sup>

Furthermore, the thermometer initially constituted something of an economic problem for the physician. Hollister explained that if a patient were dissatisfied by the lack of technological influence in their care, then they might summarily dismiss their physician and replace him with one more accommodating. Hollister also went on to warn of the danger of families going so far as to acquire their own thermometers, a phenomenon he was beginning to see in his patients: “But where is this going to end? In all families having their ‘thermometer,’ I fear... I hope not, for their own peace of mind and for the good of the profession.”<sup>139</sup>

Similar accounts appeared in popular publications as well, where they took both derisive and affirming views of the patient obsessed with their new, numerical temperature, sometimes doing both even within the same article. In the summer of 1888, *Scribner’s Magazine* published an extended essay by (the likely pseudonymous) A. B. Ward on the patient experience in New York City area hospitals. At several points in Ward’s account, the clinical thermometer took center stage, acting as a lightning rod for

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<sup>137</sup> Hugo Engel, “The Thermometer and Its Use in Medicine,” *Medical and Surgical Reporter* 46, 6 (February 11, 1882): 145–151.

<sup>138</sup> For an extended case study of one particular physician’s negotiations with patients surrounding medical testing more broadly, see Christopher Crenner, *Private Practice: In the Early Twentieth-Century Medical Office of Dr. Richard Cabot* (Baltimore, MD: Johns Hopkins University Press, 2005).

<sup>139</sup> Hollister, “A Few Thoughts on the Clinical Thermometer,” 602.

the feelings, concerns, and judgements being fomented by the systemic changes in practice of medicine. For instance, in a passage picked up and quoted by other magazines and medical journals, Ward wrote:

The importance attached to a clinical thermometer by those in ignorance of its office approaches a superstition. They close their lips tightly upon it. Their eyes roll wildly around the room. They believe the tube contains some mighty gas or a metal of mysterious power. ‘There ain’t much taste to it, docther,’ said one of these credulous fellows, ‘but I s’pose it’s *turrible sthrong*.’ Dr. —, who is something of a wag, encouraged the man’s faith in the occult virtues of the thing, and with remarkable results. After the first ‘dose,’ the fever abated. The ‘treatment’ continued, and the patient actually recovered, cured by thermometer, administered *ter in die*, without further drugging.<sup>140</sup>

In one reprinting of this anecdote, the fever thermometer was cast as a “faith cure” in the hospital. This claim was bolstered with a similar story reported in the *Medical Record* featuring an Italian patient in a surgical ward. As the story was told, this patient “took the fever thermometer, placed [it] in his mouth for a dose, and succeeded in masticating and swallowing a good part of it before the mistake could be explained to him.”<sup>141</sup>

Far more than simple professional frustration underpinned these descriptions of the ignorant, technology-worshipping patient (often also cast as an other by their speech

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<sup>140</sup> A. B. Ward, “Hospital Life,” *Scribner’s Magazine*, June 1888, 707.

<sup>141</sup> “Hospital and Faith Cures,” *The Sanitary Era: Health News and Progress* 54 (June 15, 1888): 306.

pattern or ethnicity). Historians of medicine have often focused on institutional and professional threats to physicians' practices, but they have less often paid attention to the threats that patients have posed to their physicians, often quite directly.<sup>142</sup> However apocryphal these anecdotes, they no doubt were meant to both bolster physicians' proper place as the arbiters of expertise — technological or otherwise — as well as to assuage the increasingly reasonable concern that although some patients were not capable of wielding or understanding the new tools of a professionalizing medicine, there were growing numbers of patients who were.

Despite the scornfulness with which A. B. Ward described his fellow hospital patients' relationship to the thermometer, Ward felt no such trepidation about engaging with the technology of hospital life himself:

One thing which always interested me was my temperature chart. I used to beg the nurse to take it down from its peg on the wall above my head that I might trace the zigzag line which marked my wanderings up and down the thermometer-scale. It looked like a coast-survey and was just mysterious enough to be amusing. The medical chart, registering pulse, respiration, and the like, was tame in comparison.<sup>143</sup>

For Ward (who ironically seems to not have had much more facility with thermometric readings than those patients mocked above), his temperature chart served as an assurance

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<sup>142</sup> One notable exception is Nancy Tomes, "Merchants of Health: Medicine and Consumer Culture in the United States, 1900-1940," *The Journal of American History* 88, no. 2 (September 2001): 519-547.

<sup>143</sup> Ward, "Hospital Life," 700.

that he was being properly monitored and cared for. Ward's technophilic reaction to the vicissitudes of his own temperature — which was mirrored in the excitement of medical thermometry's boosters during the same period — was not based on a fluency in the language of thermometry; the data on the chart communicated nothing to him about the progress of his illness or recovery. Rather, he was taken in by his temperature recordings because they were animated (the medical chart of his other vital signs was "tame in comparison"), making it lively enough to be perceived as communicating information even to Wards' untrained eye.<sup>144</sup>

What the chart would have been able to communicate directly to Ward, however, was a record of medical intervention: each temperature reading revealed a discrete interaction with a nurse, who by the late nineteenth century had assumed the responsibility for taking and recording patients' temperatures in the hospital. As Margarete Sandelowski describes, "The thermometer was rather quickly incorporated into routine nursing practice and almost as quickly became associated with, and even to represent, nursing."<sup>145</sup> Unlike other technologies like the stethoscope, with which physicians maintained a practical and symbolic link, physicians eventually abdicated nearly all responsibility for obtaining and recording patient temperature to nursing staff.

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<sup>144</sup> Patients in the late nineteenth century might have also encountered temperature charts at the Columbian Exhibition Worlds Fair. In the Anthropological Building, several hospital exhibits had been designed for viewing, where fairgoers could see model beds, bandages, notebooks, and photographs. One such exhibit also featured a book of blank charts of all kinds, including temperature charts among prescription blanks and diet forms. A. L. Benedict, "Some Medical Phases of the World's Columbian Exposition," *Medical and Surgical Reporter* 69, No 19 (November 1893), 724-726.

<sup>145</sup> Nurses were also responsible for the maintenance of thermometers. Margarete Sandelowski, *Devices & Desires: Gender, Technology, and American Nursing*. (Chapel Hill, NC: The University of North Carolina Press, 2000), 73.

Given the anxiety that many physicians felt about patients' ability to take their own temperatures, it may seem strange that they were apparently so willing to cede thermometry to another class of medical practitioner. Indeed, as S. Weir Mitchell so clearly argued, many physicians believed that diagnostic instruments enabled them to cement their professional identity by improving both their examination techniques and their diagnostic accuracy.<sup>146</sup> But in order to implement thermometry in the clinical setting, physicians were in dire need of aid. If one of the key components of the empiricist turn in medical practice was a reliance on observed effects, someone needed to be present to observe them. To take a patient's temperature, that someone needed to be present for as many as ten minutes at a time merely to hold the thermometer still and record the data point on a chart with all the others — and available to do so every few hours, around the clock. Physicians, unsurprisingly, were unenthusiastic at this prospect.

Rather than reject the thermometer outright or submit to the irritation of its demands, they instead responded by redefining their relationship with the tool. Physicians systematically began delegating the intimate physical work of thermometry to nurses while reserving for themselves what they regarded as the intellectual work of thermometry: *interpreting* the fever chart and using it to diagnose disease.<sup>147</sup> As a result, physicians also redefined their relationship with their patients' bodies, growing to know

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<sup>146</sup> See S. Weir Mitchell, "The Early History of Instrumental Precision in Medicine" for an elaboration.

<sup>147</sup> Sandelowski, *Devices & Desires*, 63-64. While much has been made of this trend in the history of nursing, few have investigated the similar reallocation of technological labor to patients and their family members. For discussions in the history of nursing see, for example, Sandelowski, *Devices & Desires*; Barbara Melosh, *The Physician's Hand: Nurses and Nursing in the Twentieth Century* (Philadelphia: Temple University Press, 1982).



them less through discussion or manual examination and more through the quantities precisely reported on their charts.

Instead it would be nurses — and mothers at home — who would become the stewards of the irritating, time-consuming work that Mitchell had hoped would continue to train physicians. But while historians of medicine, science, and technology have long investigated the effects of this transformation in method on professionals (both their quotidian working conditions and their epistemological groundings), few have extended that analysis to the lay users of technology.<sup>148</sup> If, as Mitchell described, we could expect instruments like thermometers to continually retrain the touch and the approach of a physician, how might it also train a mother at home? How would it fit into and change the epistemology of a lay user? What technological changes to the system of thermometry would be necessary to make its practices reliable for both mothers and physicians?<sup>149</sup> In the late nineteenth century, few spent as much time working on these questions as New York physician Édouard Séguin.

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<sup>148</sup> For only a few examples, see Porter, *Trust in Numbers*. Norton M. Wise, ed., *The Values of Precision*. (Princeton, N.J.: Princeton University Press, 1997); Charles Rosenberg, “The Therapeutic Revolution: Medicine, Meaning, and Social Change in Nineteenth-Century America” in *The Therapeutic Revolution: Essays in the Social History of American Medicine*, edited by Morris J Vogel and Charles Rosenberg (Philadelphia, PA: University of Pennsylvania Press, 1979); Charles Rosenberg, *The Care of Strangers: The Rise of America’s Hospital System* (Baltimore, MD: Johns Hopkins University Press, 1995); Rosemary Stevens, *In Sickness and in Wealth: American Hospitals in the Twentieth Century* (Baltimore, MD: Johns Hopkins University Press, 1999).

<sup>149</sup> In this analysis I am inspired by the extensive literature in the history of technology on users, including Wiebe E. Bijker, Thomas P. Hughes, and Trevor Pinch, eds., *The Social Construction of Technology Systems: New Directions in the Sociology and History of Technology* (Boston: The MIT Press, 1987); David Edgerton, *The Shock of the Old: Technology and Global History since 1900* (New York: Oxford University Press, USA, 2011); and Ruth Schwarz Cowan, *More Work for Mother: The Ironies of Household Technology from the Open Hearth to the Microwave* (New York: Basic Books, 1985).

## Family Thermometry

Édouard Séguin was perhaps the leading proponent of thermometry in American medicine. Born in Clamecy, France, Séguin received his medical training at the University Medical College of New York and spent much of his career advocating for new, behaviorist treatments for children growing up with mental disabilities. But around 1870, Séguin became increasingly interested in the growing practice of medical thermometry, along with the importation of the metric system and other uniform standards for physicians recording vital records.<sup>150</sup> Séguin was such a strong advocate for standards in measurement, as we will see, because the new medical thermometry depended utterly on an extended network of technologies and users. Despite the rhetoric of intimate touch and personal knowledge that would characterize all discussion of thermometry performed at home, it was crucial that every thermometer, every chart, and every user be similarly calibrated.

Séguin began his forays into medical thermometry by adapting the revolutionary research of German physician Carl Wunderlich for an American audience. In the 1850s at the urging of his mentors, Wunderlich had begun an exhaustive research program collecting temperature data from nearly 25,000 patients, using his more than one million unique observations to analyze the patterns in temperature changes in various diseases.<sup>151</sup> His results were published in the dense treatise *On the Temperature in Diseases* in 1868,

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<sup>150</sup> Charles L. Dana, "The Séguins of New York: Their Careers and Contributions to Science and Education," *Annals of Medical History* 6 (1924): 475–479. "The American Medical Association Proceedings," *The Boston Medical and Surgical Journal* 92, no. 19 (May 13, 1875): 565–566.

<sup>151</sup> Reiser, *Medicine and the Reign of Technology*.

which outlined in extensive detail the practices of thermometry, the importance of temperature measurements for diagnosis of disease, and detailed case studies from thirty-two individual diseases.<sup>152</sup> Although *On the Temperature in Diseases* was translated into English in 1871, it was Séguin who shaved more than 200 pages from its length for an abridged text, *Medical Thermometry and Human Temperature*, which was also amended with additions written by Séguin himself.<sup>153</sup>

But in addition to encouraging thermometry for physicians and hospital staff, Séguin also promoted his own interpretation of the greater social function of thermometry. Because he believed there to be “no part of the work of a physician for which he needs so much help as for the thermometry and thermography of his cases,” Séguin felt that in addition to students, nurses, and other hospital staff, family members would become physicians’ ideal “clinical assistants.” He lamented that because physicians were often not able to observe patients in the early stages of their illness, or to be present to take observations at every necessary moment, they were unable to provide adequate care on their own. He offered a solution:

But why is the family physician alone; and does he pretend to do everything himself, everywhere he goes? Cannot he find some help? How seldom is devotion wanted and not found, particularly at the bedside would he not have seen

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<sup>152</sup> Carl Wunderlich, *On the Temperature in Diseases: A Manual of Medical Thermometry* (London: The New Sydenham Society, 1871).

<sup>153</sup> Carl Wunderlich and Édouard Séguin, *Medical Thermometry and Human Temperature* (New York: William Wood & Company, 1871). It was also Séguin who released a volume with the same name (and much of the same text) five years later, solely under his own authorship.

the overworked mother...who would be but too happy to learn how to help him, by doing intelligently what she always did instinctively before?<sup>154</sup>

In order to aid physicians and mothers in their joint pursuit, Séguin provided multiple temperature charting methods and strategies, including charts for mothers to copy. In this volume he provided one basic table on which a relatively untrained person could record information until a physician is able to come, as well as a more detailed table that provided spaces for additional variables and calculations. Séguin described the twofold purpose of such rigorous charting: first, it provided the physician with the kind of information that he needs to do his work. Second, it enabled mothers to give physicians an objective, as opposed to intuitive, account of their child's fever, which is verified by their multiple readings with the instrument.

The year following the publication of his abridgment of Wunderlich's work, Séguin addressed the New York Medical Library and Journal Association, where he gave a paper titled "Thermometry in the Family." Using the metaphor of systole and diastole to depict the joint causes of discovery and dissemination (referencing, of course, the sphygmomanometer and its recent advances in medical technology), Séguin positioned himself at the forefront of a movement to popularize medical thermometry in America. Recognizing that "private practitioners in families" had already begun to use thermometers in earnest, Séguin found in their ready adoption of the technology a remarkable opportunity. Not only could mothers be enlisted as medical aids, extending

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<sup>154</sup> Édouard Séguin, *Medical Thermometry and Human Temperature* (New York: William Wood & Company, 1876), 282-283.

the reach of the physician's surveillance, but they could also personally benefit from the educational influence that the thermometer could provide. In his view, members of the profession should look forward to "the great advantage private practitioners will receive from the intelligent co-operation of women in the mechanical part of positive diagnosis, and the honor for our profession of rescuing women (and through them how many men too!) from the clutches of quackery and of medical theurgism."<sup>155</sup>

Séguin further elaborated his method in a text targeted directly towards mothers, titled *Family Thermometry*. In this small manual, Séguin carefully balanced his tone and instructions between scientific language and reassuring comments. He continually emphasized the connections between a mother's normal household and parenting regimens and the more clinical attentions of a physician. To accomplish this, Séguin embedded thermometry in the rhythms of the home, making it part of a mother's daily routine. He instructed his reader that in her regular contact with her children — bathing them, dressing them, putting them to bed — her hand would become, quite literally, a part of her medical toolkit. (Séguin even devoted several pages to the care of a woman's hands so that she can ensure that they will remain well-suited to the task and able to "uniformly" follow his instructions for temperature reading. If she keeps them smooth, clean, not too dry and not too moist, Séguin's teaching would help her turn her "loving hand" into a "knowing one.")<sup>156</sup>

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<sup>155</sup> Édouard Séguin, "Thermometry in the Family," *Archives of Scientific and Practical Medicine* 1, no 1 (January 1873) 37-42, 37.

<sup>156</sup> Édouard Séguin, *Family Thermometry: A Manual of Thermometry for Mothers, Nurses, Hospitalers, Etc., and All Who Have Charge of the Sick and of the Young* (New York: G. P. Putnam & Sons, 1873), 6-7.

But her educated hand was only the first in a series of tools that a mother must use — once she sensed any peril, sickness might be on its way. At the first sign, she must begin to take and record her child's temperature at multiple points during the day. Reproducing a chart very similar to the basic table from *Medical Thermometry and Human Temperature*, Séguin then instructed her to perform several simple mathematical calculations, finding daily averages, daily differences, weekly averages, and other figures derived from her readings. Once collected, this data could be given to a physician for final analysis and prescription. (See Figure 3.1)

While Séguin instrumentalized mothers hands as a tool they could use, he did not quite instrumentalize mothers themselves. In much of the literature on health care workers, nurses and technicians are characterized as tools, or as mere extensions of physicians; nurses are sometimes referred to literally as “physicians’ hands.”<sup>157</sup> But in Séguin’s case, mothers were slightly more independent actors who needed to be enlisted in a labor process. In the manual he wrote, “As soon as you become a mother...you know more with your newborn feelings than we with our books. I have only to show you how to make use of your heart’s knowledge.”<sup>158</sup> Although he tactically flattered his reader to a slightly obsequious degree, he also recognized mothers’ positions and the utility of the home care routines that they had already established with their children. The next step, then, was to transform a mother’s kind of knowledge and practice into his; it was only the

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<sup>157</sup> Sandelowski, *Devices & Desires*. Barbara Melosh, *The Physician’s Hand: Nurses and Nursing in the Twentieth Century* (Philadelphia, PA: Temple University Press, 1982).

<sup>158</sup> Séguin, *Family Thermometry*, 8

act of regular temperature charting that could make a mother a reliable, medical reporter of her child's health.

Never forgetting his audience of physicians, Séguin addressed them directly in a post-script to *Family Thermometry*. He asked them to view this text not as an exhaustive discussion, but rather as a short, practical guide for their assistants, to be used along with the technological system of thermometers and published charts. He reiterated again the benefits of the division of labor that thermometry makes possible. It would serve to “lighten their own responsibility as practitioners...by instructing mothers...in the art of giving indubitable reports.”<sup>159</sup>

### **Mothers Becoming Practitioners**

Clinical thermometers began to be marketed to home users in addition to physicians and nurses via advertisements in catalogues alongside other types of thermometers (e.g. food and weather thermometers) as well as alongside other household items. Sears, Roebuck & Company catalogues, for example, often displayed medical devices like crutches and thermometers alongside other domestic goods such as farm knives, cleaning products, and bath brushes.<sup>160</sup> Montgomery Ward and Co. was another popular purveyor of thermometers for all purposes, including for farm incubators and

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<sup>159</sup> Ibid., 72. *Family Thermometry* was widely reviewed in both the medical press and in the popular press. For just a few examples, see *Boston Medical and Surgical Journal* 88 (1873); *Buffalo Medical and Surgical Journal* 13 (1873), 38; *Herald of Health* 21 (M.L. Holbrook, 1873); *The eclectic magazine of foreign literature, science, and art* 17 (Leavitt, Trow, & Co., 1873); *Popular Science Monthly* (March 1873).

<sup>160</sup> Sears, Roebuck & Co. Catalogue, 1897.

brewing equipment, in addition to those for medical uses.<sup>161</sup> What the placement of such advertisements indicate is the extent to which in the late nineteenth century thermometers for all purposes, including medical ones, were already becoming embedded in the regular accoutrement of the well-run home.<sup>162</sup> Additionally, most clinical thermometers were sold with accompanying carrying cases, which ranged from simple with austere pocket-clips to elaborately engraved metal cases with chains in the style of women's chatelaines, which could be clasped to a woman's waist. Chatelains were both decorative and useful, and allowed women to keep all manner of small household items close at hand, including keys, small purses, scissors, tweezers, thimbles, and other useful items for the household or bath.<sup>163</sup>

Although listings for clinical thermometers in such large catalogues often appeared with only limited detail about their application, many advertisements in other forums also took on an instructional role. When advertisements for thermometers appeared in popular publications, such as one advertisement for Taylor Clinical Thermometers that appeared in an issue of *The Literary Digest*, they often used both images and extensive text to describe how to use thermometers at home.<sup>164</sup> One particular advertisement provides evidence of some of the ways that mothers were instructed to use their thermometers. The text read, "As the barometer tells of the

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<sup>161</sup> Montgomery Ward & Co. Catalogue, 1895.

<sup>162</sup> For more on general trends in household thermometry, see Chapter 4.

<sup>163</sup> Fred W. Burgess, *Antique Jewellery and Trinkets* (New York: G. P. Putnam's Sons, 1919), 281-286.

<sup>164</sup> This particular advertisement appeared alongside advertisements for pianos and armchairs. *The Literary Digest* XXI, no. 11 (September 15, 1900).



approaching storm, so does The Taylor-Certified Clinical Thermometer tell of approaching sickness. Take your temperature and that of your children regularly.” In the images of the advertisement, the reassuring sight of a male physician at the patient’s bedside also indicated that mothers were not involved in this activity alone — while initial monitoring was a mother’s responsibility, thermometry was not an individual pursuit. The physician was always available to become involved when the patient’s temperature demanded it.

To the left of the image, the reader was provided with even more instruction. An enlarged image of a thermometer appeared with varying degree marks labelled with their meaning: the states of “health (normal temperature),” “fever,” “danger,” and “collapse” were all indicated. Additionally, the reader was reassured that additional instructions would be included with each instrument. Mothers were not left entirely to their own instincts in using the device. Each thermometer came with a small booklet titled *Danger Signals of Disease* which explained how the thermometer was to be handled, as well as with “6 copyrighted clinical charts” which a mother would need to fill out with temperature readings. These charts were developed in collaboration with a physician, and were also available to be sold separately, to supplement the household supply.<sup>165</sup> (See Figure 3.2)

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<sup>165</sup> Taylor fever charts were sold both packaged together in binders or unbound loose in boxes. General Letter, No. 252 to Taylor Instrument Companies Salesmen (February 22, 1912), Taylor Instrument Co. Papers, University of Rochester River Campus Libraries Manuscript and Special Collections.

The relationship between these charts, the mother, and the physician are much murkier in advertisements than they are, for example, in Séguin's manual. In these advertisements, temperature charting was sold to mothers as a prognosticating technology; the "danger signals" of illness would be apparent in their transcription. The physician could be called upon when needed, but it was the mother's responsibility to read her child's temperature chart well enough to be aware when that point came.

Additionally, popular magazines like *The Ladies Home Journal* and *Good Housekeeping* often ran articles that contained information about thermometers and instructed mothers in how to properly care for their sick family members, including those afflicted with fevers. They emphasized that thermometry — like all childcare — was continuous work, and that checking in only periodically was insufficient. One article in *Good Housekeeping* admonishes that if a child's temperature is high for only "an hour or less," then this might be a sign not of disease but merely of the child's nature.<sup>166</sup>

Thermometry also made it possible to determine the supposed truth of a child's health in the presence other symptoms, or when a child's subjective descriptions might be found in suspicion:

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<sup>166</sup> E. I. Brooks, "Echoes from the Sick Room: Clinical Thermometers and Hot-water Bags," *Good Housekeeping* November 1894, p 221. The gendered nature of thermometer reading becomes evident in an example made in this article. It admonishes, "[If] you know Mary to be of an excitable, emotional nature, you may put the chill down to 'nerves,' and if Mary is a sensible girl or, what is more important, has a sensible mother, she will get over her tendency to an hysterical attack, study self-control and make a fine woman." During the nineteenth century, the suggestion is repeatedly made that the thermometer will make it possible to distinguish between supposedly true illness and mere female hysteria. A more lengthy and longitudinal analysis of the thermometer's role in rhetoric around female health, emotion, and sexuality is certainly warranted, and planned, but impossible to include here.

It is astonishing how often burning cheeks and aching head are accompanied by no high temperature at all. On the other hand, not infrequently a child has been thought to be shamming and forced to school, when the thermometer would have caused the disease to be 'taken in time', and perhaps a life would have been saved...It takes an experienced hand to detect a malingerer.

In such cases, being aware of a child's temperature over time could ease a parent's worry, clear a child's reputation, save their life, and even, the article also notes, lessen their doctor's bill, when properly applied.<sup>167</sup>

These articles expected even further autonomy on the part of women caring for their family members once a fevered state had been determined, an expectation which dictated that mothers have the proper tools at their disposal to do their jobs properly, regardless of cost. They included extended instructions on how to properly care for and use thermometers, as well as lengthy descriptions of their benefits. By monitoring the variations of their child's temperature, mothers could know when to administer different kinds of home care, such as cold baths, special diets, hot water bottles, etc.<sup>168</sup> By the early twentieth century, publications like *Popular Science Monthly* contained information about medical thermometers that included even more detail about how the technology functioned and could be best cared for at home, as well as numerous advertisements.<sup>169</sup>

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<sup>167</sup> Ibid., 221.

<sup>168</sup> For only a few examples, see Brooks, "Echos from the Sick Room," and Annie R. Ramsey, "Nursing in Fevers," *The Ladies Home Journal* (October 1889).

<sup>169</sup> "Every-Day Wonders," *Popular Science Monthly* (January 1922), 43

Such placement of the thermometer within the realm of the domestic sphere served as a clear and early designation of the place that the thermometer would grow increasingly to occupy over the course of the twentieth century. Despite its continued usefulness in the hospital and the laboratory, this association with women's work has rendered its impacts on those women, and their understandings of the body, largely invisible.<sup>170</sup>

### **The Doctor's Thermometer is the Mother's Thermometer**

Beyond home care, temperature charts enabled mothers to provide quantitative information to physicians; furthermore the process of charting enabled them to both know when a physician's expertise was needed and to prove to physicians that their labor was valid and their data verified. (As one review noted, Séguin's tables would no doubt help "intelligent nurses, whether private persons or professionals...aid the doctor.")<sup>171</sup> By collaborating with physicians in this detailed health care work, it was reinforced for mothers that, in order to properly take care of their children, it was just as important to regularly insert glass into their children's bodies as it was to lay hands upon them.

Practicing thermometry did not just familiarize mothers with physicians' language and methods. Because it was repetitive and documented work, domestic thermometry

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<sup>170</sup> This phenomenon — of domestic technologies that are associated with women's work losing their status as technological objects and becoming subsumed into the invisible labor women perform — is exquisitely elaborated in Schwartz Cowan, *More Work for Mother*.

<sup>171</sup> W. Bathurst Woodman, "Séguin on Physiological Thermometry," *The London Medical Record* (February 4, 1874) 69-70.

helped home users to internalize and continually recreate for themselves scientific medicine's new quantified view of the body.

A specific case of a failed thermometer illustrates the importance of the labor function of thermometry's quantification. In writing and promoting *Family Thermometry*, Séguin proposed that it would be advantageous for mothers to own a unique thermometer, designed especially for their use. This "mother's thermometer" would not be labeled according to a Fahrenheit or Celsius scale; instead, it would follow a simplified scale that Séguin proposed and called a "Scale of Vitality." This scale ran from a "Standard of health" at zero to "often fatal" at 5, to "No well-authenticated recovery" at 7. (See Figure 3.3)

Despite producing and promoting this thermometer in his manuals, in professional literature, and to audiences of physicians, Séguin's mother's thermometer never gained much traction in either professional or lay circles.<sup>172</sup> His justification for its use, that it would further simplify thermometry for mothers, detracted from its primary utility in the labor network between physicians, nurses, and mothers.<sup>173</sup> For all actors involved, it was crucial that body temperature be not just quantitative, but quantitative *on the same scale*. To move through the medical labor network it was crucial that temperature be a commensurable object.

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<sup>172</sup> One still extant example is displayed in the collections of the Dittrick Medical History Center and Museum in Cleveland, Ohio.

<sup>173</sup> Although Séguin promoted family thermometry explicitly as an answer to a labor problem for physicians, he was also continually developing new medical devices of his own design (thermometric and otherwise) and attempting to propagate their use. It does not appear that he was every particularly successful in these ventures.

Despite the rhetoric that would grow to surround thermometry, largely begun by Séguin himself, that would connect its instrumental intimacies to loving feminine touch, delegating and feminizing the practice of thermometry was primarily a solution to a labor problem. As with Séguin's failed mother's thermometer, the successfully constructed domesticity — and resulting invisibility — of the thermometer was the result of a deliberate agenda to move some of the labor of the newly professionalizing medicine onto the shoulders of lay women.

But just as, in Silas Weir Mitchell's words, "the thermometer trains the man," the thermometer also trained the mother. The values embedded in the thermometer — values that privilege quantified over qualified knowledge, the memory of a chart over the detritus of a sick room, the instrumental hand over the feeling one, the "wholesome appetite for precision which, at last, become[s] habitual" — became the habits, and thus the unconscious values, embedded in mothers' medical care.

## **Chapter Four**

### **Beyond the Elbow Test: Merging Medical Epistemologies**

Despite the early conflicts amongst medical professionals over the utility and dissemination of thermometers in the late nineteenth century, by the early twentieth century the thermometer had been fully adopted by a number of other interested parties, including lay users, public health professionals, and instrument manufacturers. Though they had, in the nineteenth century, been treated as paragons of a revolutionary approach to bodily knowledge and as totems of laboratory science's influence on medicine, as thermometers became more thoroughly introduced into American homes they became integrated with existing regimes of medical knowledge that were based in pre-bacteriological ideas about disease and sickness. In the spheres of domesticity and commerce, where medical professionals and medical expertise were consulted and enrolled but not treated with extreme deference, medical thermometers maintained their integrity and allure as scientific work objects, but their meaning also expanded to incorporate health epistemologies that still persisted alongside new trends in science and public health.

In the previous chapter, we saw how physician Edward Séguin integrated the medical thermometer into mother's caring work for their children. In this chapter, we will examine how the nation's leading thermometer manufacturer and public health

reformers integrated the medical thermometer into the existing modes of environmental control that mothers engaged in in the home, and explore further how this melding of epistemic modes contributed to the erasure of its status as a “technology” at all.

The thread of this argument draws heavily from Star and Griesemer’s work defining boundary objects.<sup>174</sup> Here the thermometer moves between the social, as well as epistemic, worlds of physicians, nurses, drugstore owners, public health reformers, manufacturers, and the lay public. A certain use pattern typically accompanied the application of a thermometer to a body, one which included particular placements on the body as well as inscriptions of data onto a standard record, but it is generally here that typical use ends. Star and Griesemer write, “Standardizing methods is different from standardizing theory. By emphasizing how, and not what or why, methods standardization both makes information compatible and allows for a longer ‘reach’ across divergent worlds.” I argue that the thermometer had a larger reach within the home than the other new diagnostic technologies of the late-nineteenth century—and ultimately, such success introducing a quantitatively-inclined approach to health more generally—precisely because its methods could be standardized quickly, while standardizing the theory upon which temperature-taking was scientifically based could happen more gradually. “Temperature” became the common language of physicians, nurses, and

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<sup>174</sup> Susan Leigh Star and James R. Griesemer, “Institutional Ecology, ‘Translations’ and Boundary Objects: Amateurs and Professionals in Berkeley’s Museum of Vertebrate Zoology, 1907-39,” *Social Studies of Science* 19, No. 3 (August 1989), 387-420.



mothers, for example, but why they spoke of temperature, and what they believed it conveyed, was at first quite different.

### **The Body in the Environment**

During the early nineteenth century, prior to both the Bacteriological Revolution and the revolution in standardizing diagnostic instruments, both medical and common-sense understandings of the body were quite different. Numerous principles of humoral medicine persisted, particularly in more popular speech and writing, and the body was often construed as a set of interacting forces and flows that were intimately connected with both the interior emotional state of a person as well as their external environment. Historian Conevery Bolton Valencius describes this transition:

As the century progressed, common usage moved away from humoral language and tended to emphasize sensations of fullness, heaviness, constriction, heat, or congestion, which moved and flowed within the body. Beneath a variety of expression, however, endured a sense of the body as composed of energies and forces that were subject to movement, collection, and release, and whose governance was the task of each individual.<sup>175</sup>

Temperature, of the greater environment in which a person lived and the smaller interior environment of their home, played a particularly acute role in this regime. Rapid changes

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<sup>175</sup> Conevery Bolton Valencius, *The Health of the Country: How American Settlers Understood Themselves and Their Land* (New York: Basic Books, 2004), 60. The second chapter of Valencius' book, in particular, does an excellent job of describing the intricacies of early-nineteenth-century Americans' bodily epistemologies.

in temperature were especially threatening, as they could disrupt the natural flow of a body's internal forces. Valencius describes how, when weather changes or other variations threatened a person's internal state, they might attempt to counterbalance that change with hot or cool drinks, baths, or stimulating or soothing foods.<sup>176</sup>

Monitoring and managing the environmental and home temperature, then, was of grave importance to all, but especially to the mothers who were managing both the general home as well as the sickroom. Temperature was a consistent topic of discussion in domestic manuals throughout the turn of the century, including the highly popular Spons' Household Manual, published in multiple editions in both England and the United States. This text proscribed the healthful temperatures of ambient air in the household and sickroom, of food and hot water bottles, and all temperature proscriptions are made unproblematically and without much explanation. It seemed assumed that the audience of household managers would both be able to use household thermometers without instruction and be inclined to care about their readings without very much inducement.<sup>177</sup> A guide on home nursing and childcare, written for the women of a family more than three decades later in 1930, contained similar prescriptions.<sup>178</sup>

Both texts contained inducements that the advice contained therein was drawn from "modern science" and communicated expert advice. The nineteenth-century manual

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<sup>176</sup> Ibid., 75.

<sup>177</sup> *Spons' Household Manual: A Treasury of Domestic Receipts and Guide for Home Management* (New York: E & F. N. Spon, 1891).

<sup>178</sup> C. E. Turner, Nell Josephine Morgan, and Georgie B. Collins, *Home Nursing and Child Care* (New York: D. C. Heath and Company, 1930).

began, “It may safely be said that the mistress of the family is called upon to exercise an amount of skill and learning her daily routine such as is demanded of few men.”<sup>179</sup> The early twentieth-century manual, similarly, explained that its advice had been developed from the teaching experience of its authors, who included a trained instructor of home nursing, a professor of biology, hygiene, and public health, and a director of health education.

An important distinction, however, between the temperature recommendations in these two texts (which is illustrative of descriptions in other volumes) was in the way that thermometers themselves were mentioned. In the Spons’ manual, for example, the best home air temperature was described as being between 62 and 70 degree Fahrenheit. When these figures are mentioned, the text was quick to follow with a reminder that these figures were not mere estimations; they were precise, determinable quantities. The air temperature “should not be allowed to vary much, and since feeling is often deceptive, it is always advisable to keep a thermometer in the home.”<sup>180</sup> By the 1930s, however, the thermometer — but not temperature — had disappeared from the volume on home nursing instruction. In an extensive description of how to provide an effective bed bath to a bed bound patient, the authors provided a list of necessary items that include bathing supplies like talcum powder, toothpaste, rubbing alcohol, soap, towels, etc. Among the very first instructions, following this list, was to check the temperature of the bathwater,

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<sup>179</sup> Spons’ Household Manual, 755.

<sup>180</sup> *Spons’ Household Manual*, 755.

which ought to be in the very narrow range between 68 and 70 degrees Fahrenheit.<sup>181</sup>

Nowhere in these bathing instructions is a bath thermometer listed, despite the necessity of one for detecting such a specific range. In other instances in the manual, bath and room thermometers are mentioned off-hand (for instance as part of the suite of objects needed to bathe a baby), but little is made of them. They are merely assumed.

One of the material mechanisms by which this instrument became invisible was, ironically, through the work of the companies who were manufacturing and selling the technology itself.

Keeping thermometers both indoors and outdoors to monitor air temperature was a common part of nineteenth-century life.<sup>182</sup> This is reflected in the popular trend of advertising thermometers: thermometers that were embedded in wood, cardstock, or another decorative item that held advertising messages and could be distributed to one's customers or potential customers to keep in their home. Explaining their appeal, one turn-of-the-century advertising industry publication reports that, "many of the largest national advertisers consider the wooden thermometer the best medium of specialty advertising for general publicity that can be used... One needs a thermometer in every room of his office and home. Thermometers are never put in a waste basket."<sup>183</sup> Playing off of the trade description of "advertising novelties" (which included everything from thermometers to calendars, rulers, mirrors, pencils, etc.), one catalogue selling such

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<sup>181</sup> Turner et al, *Home Nursing and Child Care*

<sup>182</sup> For example, Valencius refers to this habit in *The Health of the Country*.

<sup>183</sup> R. W. G. Root, "Advertising Novelties," *Ad Sense* 19, No 3 (September 1905), 236-238, 237.

advertising thermometers touted their virtues, advising merchants that “Thermometer Advertising is not novelty advertising. It isn’t something new and untried nor is it freak advertising. It has been on the market for years and has proven its value.”<sup>184</sup>

Given the success of these advertising thermometers that took readings of the air, it is of little surprise that by the 1930s advertising thermometers had expanded to include not just wall-mounted thermometers but also to branded baby bath thermometers and fever thermometers with cases etched with the names of retailers, producers, or persons whose industries are health related, including drug stores, baby food manufacturers, undertakers, doctors, or anyone else “who want[s] to attract the housewife.” As the copy describing the “Health-Meter” wall thermometer describes, “You know she will see the advertisement *every day*.”<sup>185</sup>

In addition to incorporating fever thermometers into existing giveaway strategies, which were themselves built into existing temperature-taking practices that had to do with taking care of health, instrument makers also added a layer of expert-driven medical justification and epistemic-value onto their thermometers, both materially — i.e. directly on the instrument itself -- and through the educational programs and sales material that

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<sup>184</sup> *Advertising Thermometers Increase Profits* catalogue, (Rochester, NY: Taylor Brothers Company), Taylor Instrument Co. Papers. Indeed, advertising thermometers continued to be a profitable line for Taylor well into the 1940s, when they continued to tout the wide variety of businesses that utilized them, from department and hardware stores to banks, laundries, lumber yards, newspapers, and gas companies. “What’s Cookin? Taylor Weekly Sales Letter,” Vol 3 No 36 (July 9, 1948), Taylor Instrument Co. Papers.

<sup>185</sup> *Taylor Advertising Thermometers* catalogue, (Rochester, NY: Taylor Instrument Companies Taylor Bros. Division, 1936), Taylor Instrument Co. Papers. Some advertisers advocated for a change in the industry term from “novelty” to “speciality,” in reference to the fact that the tradition of using such items as advertisements was, in truth, quite old. “Advertising Novelty Department,” *Ad Sense* 19, No 2 (August 1905), 136-137.

they targeted directly to consumers. What's more, they further focused this strategy onto the women of a household, specifically mothers; and more specifically, new mothers. Taylor Instruments, the nation's leading thermometer manufacturer, promoted its advertising thermometers as the first item that new parents should receive from retailers: "As birth announcements appear...a letter is immediately sent, with a thermometer to the new comer...Think of the possibility of this plan for druggists who sell baby supplies, milk dealers with a new active customer, banks on the lookout for new life-long accounts."<sup>186</sup>

In this way, thermometer manufactures were inserting themselves into a discourse that was already taking place and taking advantage of changing trends in both mothering and health care management that would reverberate well into the future. Historian Rima Apple has argued that, over the course of the late-nineteenth and early-twentieth century, both physicians and mothers placed an increased importance on professional advice when it came to the subject of childrearing and household management.<sup>187</sup> But also, as Nancy Tomes has cogently argued, "medicine's expanding cultural authority by no means spelled an end to the nineteenth-century tradition of 'every man his own doctor.'"<sup>188</sup> At the same time that the purveyors of consumer goods showed increasing respect and submission to the terms of professional medical expertise, the early twentieth century

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<sup>186</sup> *Taylor Advertising Thermometers catalogue*, Taylor Instrument Co. Papers.

<sup>187</sup> Rima Apple, *Perfect Motherhood: Science and Childrearing in America* (New Brunswick, NJ: Rutgers University Press, 2006).

<sup>188</sup> Nancy Tomes, "Merchants of Health: Medicine and Consumer Culture in the United States, 1900-1940," *Journal of American History* 88, No 2 (September 2001), 519-547, 534.

also ushered in more drugs and devices for consumers to use to take care of their health at home, particularly so long as they did so in a doctor's image.<sup>189</sup>

Americans' new, somewhat ambiguous role in medical care emerged co-constitutively with Americans' also new, somewhat ambiguous role in consumer culture.<sup>190</sup> Charles McGovern and Lizabeth Cohen have convincingly established that, between 1890 and 1960, a new mode of thinking about American democracy was explicitly created, one that equated consumption of goods with political participation, one that made leveraging purchasing power the seeming equivalent of democratic participation. Americans, they argue, used mass market purchases to define themselves (this was particularly true for immigrants desiring to assimilate), and viewed consumption as a way to engage fully in the economy — and thus the life of the nation.

William Leach goes one step further in analyzing this new market-based democracy,

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<sup>189</sup> Many additional historians have done excellent work describing the medical marketplace and the competing epistemologies that characterized this era of medicine, particularly as pertains to the material technologies that were often the proxies upon which conflicts were waged. For a discussion of homeopathic medical kits, which provided mothers specifically with an alternative medical technology based on competing ideas about health and disease, see Anne Taylor Kirschmann, *A Vital Force: Women in American Homeopathy* (New Brunswick, NJ: Rutgers University Press, 2004). For a discussion of the coexistence for physicians of traditional therapeutics and miasmatic theory along with new diagnostic technologies and germ theory, see Charles Rosenberg, "American Medicine in 1879," *Send Us A Lady Physician: Women Doctors in America, 1835-1920* (New York: W. W. Norton & Company, 1985).

<sup>190</sup> A massive body of literature exists describing the history of American consumer culture. Most influential to me in this line of argument are William Leach, *Land of Desire: Merchants, Power, and the Rise of a New American Culture* (New York: Vintage Books, 1994); Charles McGovern, *Sold American: Consumption and Citizenship, 1890-1945* (Chapel Hill, NC: University of North Carolina Press, 2006); and Lizabeth Cohen, *A Consumer's Republic: The Politics of Mass Consumption in Postwar America* (New York: Vintage Books, 2003). Also of note are T. J. Jackson Lears, *Fables of Abundance: A Cultural History of Advertising in America* (New York: Basic Books, 1995); Roland Marchand, *Advertising the American Dream: Making Way for Modernity, 1920-1940* (Oakland, CA: University of California Press, 1986). I was also influenced by Christopher Wilson, "The Rhetoric of Consumption: Mass Market Magazines and the Demise of the Gentle Reader, 1880-1920," in Richard Fox and T. J. Jackson Lears, eds., *The Culture of Consumption: Critical Essays in American History, 1880-1980* (New York: Pantheon, 1983), in which Wilson argues that popular magazines at the turn of the century became a mechanism through which consumer rhetoric became broadly applied across areas of American life, using an intimate tone to generate trust.

arguing that this view of society had the result of “democratizing individual desire — rather than wealth or political or economic power.”<sup>191</sup> This move, with its endless focus on desire, created a laser focus on discipline and sacrifice in the name of achieving it, to the point of denying the broader future, and even death, by focusing so strongly on want.

I argue that this national ethic of consumption that made purchasing the right thing a duty, rather than a mere possibility, commingled with the tension between the ethics of “every man his own doctor” and “doctor knows best.” The responsibility to actively choose and manage one’s own best life — and, particularly if you are a mother, your family’s best life — extended easily to consumer medical goods. There, then, a consumer becomes subject to the rigors and expectations of performing simultaneously the duties of taking care of oneself on their own *and* being sure to do so in a way that maintains their own credibility — and usefulness — in the eyes of their doctor.<sup>192</sup> This is one reason why it is important to recognize the labor that lay people perform in medicine. In this configuration, consumption and labor became more than inextricable; they were literally the same. At this nexus, the thermometer crossed an additional boundary, the line between consumer good and work tool, and in so doing made itself a particularly strong locus for absorbing and communicating new epistemologies and values.

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<sup>191</sup> Leach, *Land of Desire*, 7.

<sup>192</sup> The tensions in the previous chapter between patients and doctors who disagreed over the proper application of the thermometer illustrate the importance of a shared view of proper health care. Numerous scholars have examined the process of education that young mothers went through to become responsible, scientifically-informed mothers, including Apple, *Perfect Motherhood*; Julia Grant, *Raising Baby by the Book: The Education of American Mothers* (New Haven, CT: Yale University Press, 1998); Molly Ladd-Taylor (*Raising a Baby the Government Way: Mothers’ Letters to the Children’s Bureau, 1915-1932* (New Brunswick, NJ: Rutgers University Press, 1986); Ann Hulbert, *Raising America: Experts, Parents, and a Century of Advice About Children* (New York: Knopf, 2003).



## **Selling Science**

Between 1910 and 1950, Taylor Instrument Companies in Rochester, NY underwent a concerted advertising, marketing, research and development process to boost sales of their original fever and clinical thermometer lines as well as to introduce an entire suite of “health thermometers” to the American market. Taylor Instruments was founded in the year 1851 solely manufacturing atmospheric thermometers, but by the early twentieth-century Taylor had grown into the largest manufacturer of thermometers and barometers in the world, and expanded their operations into the manufacturing of a multitude of medical, meteorological, and industrial instruments.<sup>193</sup> The company received a significant boost during World War I, when the importation of cheaper German thermometers was ceased, and Taylor was able to fill the market gap with American-made, more expensive, thermometers. They also mobilized an accompanying advertising front, including booklets, sales bulletins, and elaborate catalogues describing not only their wares but also the history of thermometry, Taylor’s manufacturing processes, and,

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<sup>193</sup> Taylor also did considerable business in the global export market, including South America, Africa, Australia, and the “Far East,” but discussion of those activities has been limited here for scope. News Bulletin (July 1918), Taylor Instrument Co. Papers

critically, extensive educational material about the practice and importance of regular thermometry in the home.<sup>194</sup>

Beginning the 1910s, the primary advertising strategy for Taylor's domestic thermometers revolved around health. Their rhetorical strategy relied a great deal upon the principle of educating, specifically, the mothers of the house about the superior quality of Taylor products in the temperature-monitoring that, much of their advertising copy implied, the responsible mother was already doing at home. Taylor sought to increase their credibility and their skills in this area by, in 1914, establishing a dedicated Medical Department under the charge of Edward Jackson, a consulting physician.<sup>195</sup> Increasing user education about fever thermometers was obviously a major component of this campaign, but fever thermometers formed only one-third of the suite of health-based home thermometers that Taylor manufactured and sold. Indoor and outdoor weather

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<sup>194</sup> A. B. Maurer, "How to Supplant German Goods in the American Market," (presentation to Salesmen's Annual Convention, July 1914), Taylor Instrument Co. Papers, University of Rochester River Campus Libraries Manuscript and Special Collections. In addition to supplanting German-made thermometers on the market, which were relatively inexpensive compared to many of Taylor's lines, there was also a concern among salesmen that the bulk of the company's own lower-priced thermometers would be sold to foreign governments, leaving Taylor without a stock of cheaper thermometers to sell on the domestic market. This situation additionally motivated the salesmen to increase demand for the more expensive, higher quality thermometers among American consumers. J.A. Sutherland, "How Can We Best Increase the Sale of Fever Thermometers," (presentation to Salesmen's Annual Convention, July 19, 1915), Taylor Instrument Co. Papers.

<sup>195</sup> At the time Taylor was expanding its production of a variety of medical instruments, including everything from vials for urinalysis to electrocardiograph machines. News Bulletin (February 1914), Taylor Instrument Co. Papers.

thermometers were included in this suite, as were “household” thermometers for temperature-taking in the bath and in the kitchen.<sup>196</sup> (See Figure 4.1)

As discussed in the previous chapter, physicians were often downright hostile to the idea of their patients owning and using fever thermometers, and this was a hurdle to wider sales that Taylor salespeople addressed directly. A female saleswoman identified as only Miss. F. Taylor addressed the annual Taylor Salesmen’s Convention in the summer of 1914 with her experience:

I have frequently found physicians antagonistic to the idea of having their patients own and use their own fever thermometers. Their argument has been that the average person knows nothing about the intelligent use of the clinical thermometer. I have then explained to them that it is my work to teach the laymen how to take temperatures, how to read, disinfect and care for a thermometer, also to teach them some of the fundamental facts about fever and thus obviate the scare sometimes caused by a rise of temperature.<sup>197</sup>

In addition to the suggestion that thermometer manufacturers might actually relieve physicians of the duty to provide additional instruction to their patients, Miss Taylor continued her argument using the same justifications that Seguin proposed several decades earlier; as she put it, “a thermometer in the hands of a person understanding its

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<sup>196</sup> Initially, this strategy also sought to incorporate barometers and hygrometers, which measured humidity. One particular salesman, a Mr. J. A. Sutherland, proposed that Taylor go so far as to adopt a new slogan for its operations: “For health and efficiency, keep the temperature at 70 degrees or under and the Humidity at 50% in the home, school, office, or factory. Ask your Doctor.” J. A. Sutherland, “Humidity and Hygiene,” (presentation to Salesmen’s Annual Convention, July 1914), Taylor Instrument Co. Papers.

<sup>197</sup> F. Taylor, “Construction of Fever Thermometers,” (presentation to Salesmen’s Annual Convention, July 1914), Taylor Instrument Co. Papers

use is often a great aid to the physician.”<sup>198</sup> Ultimately appealing to the usefulness of patient participation in the work of temperature taking was a successful tactic. Miss Taylor reports that she and her fellow salespeople ultimately convinced the physicians they spoke with to actively prescribe Taylor’s Tycos brand of thermometer for the patients to use.<sup>199</sup>

Taylor’s promises to teach “the laymen” how to engage in thermometry did not go unfulfilled. Demonstrations of products were a particularly useful and common route, especially when salespeople were accompanied by established medical professionals that could both conduct the teaching and lend credibility to their claims. In the Chicago region, for example, Taylor employed two nurses to visit 23 different towns, demonstrating Taylor’s instruments and best thermometry practices to sales clerks in 52 different drugstores and surgical supply houses.

In conjunction with these demonstrations, they also advertised with 11 newspaper placements and more than 10,000 cards sent directly to consumers through the mail.

The results were impressive. In the Chicago region, sales of Tycos brand thermometers increased approximately 75% over the previous year before the demonstrations. One salesman reported, “I think the plan of nurses’ demonstration in drug stores is the best thing we have ever done. Taking the 37 drug stores that the girls demonstrated in, [I] would say that 50% were sold where we never before placed a Tycos

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<sup>198</sup> Ibid.

<sup>199</sup> Ibid.

fever thermometer...the success we have had with these thermometers is due to the fine work done by the nurses.” Dealers visited by the nurses followed up with repeat orders of the line.<sup>200</sup> Salespeople were particularly excited about this strategy and its success because it enabled them to increase sales on their more expensive instrument lines.

For the next three decades, Taylor expounded on this strategy, using multiple methods to communicate that the importance of using Taylor fever thermometers lied in Taylor’s accuracy, quality of craftsmanship, and connection to the latest and best medical science.<sup>201</sup> But Taylor also expanded its sales by linking together fever thermometers with *other* household thermometers into collections labelled “Health Thermometers” that included wall thermometers, bathwater thermometers, and fever thermometers alike.<sup>202</sup> Even the nurses used in the pilot program above did not restrict their efforts solely to thermometers that could be used to detect fever; some also made displays of weather instruments and discussed their features and benefits within the home.<sup>203</sup> In this suite of thermometers, Taylor built its advertising and educational campaigns around their customer’s existing beliefs in the healthfulness of certain temperature flows and changes, while incorporating modern benefits that only (their) instruments could provide: the

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<sup>200</sup> Sutherland, “Humidity and Hygiene.”

<sup>201</sup> A small sampling of such efforts include presenting their wares at the Century of Progress World’s Fair in Chicago, IL in 1933-34 in the Hall of Science beside displays by a number of other instrument and consumer device makers. They collaborated with the American Medical Association and the American Red Cross on a variety of exhibitions and programs, and engaged in a national advertising campaigns that reached the nation’s highest-circulation publications, including the *Ladies Home Journal* and *Saturday Evening Post*. Taylor Instrument Co. Papers.

<sup>202</sup> *The Tycos Book* catalogue (Rochester, NY: Taylor Instrument Companies, 1927), Taylor Instrument Co. Papers.

<sup>203</sup> Taylor, “Construction for Fever Thermometers.”

safety of accuracy, the individuation of experience made possible by precision, and the peace of mind brought by objective confirmation.

#### Wall Thermometers<sup>204</sup>

The utility of air temperature thermometers within the home, school, and office was a theme repeated ad nauseum in Taylor advertisements, combining a new, medically-inflected instrumental precision with an earlier understanding of healthful vitality based on harmony with ones' environment:

Even more than family comfort hangs on its verdict: for overheated rooms mean reduced vitality, colds and diseases of the respiratory tract are caused in a large measure by overheating, while rooms below 68 degrees entail colds and kindred ills.<sup>205</sup>

To further enforce the connection between the healthfulness of 68 degrees Fahrenheit, the wall thermometers in Taylor's Health line were stamped with a red line cutting the thermometer in half at exactly that measurement.<sup>206</sup> In this way, the air thermometer

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<sup>204</sup> For the future project on thermometers and gendered hysteria, the following anecdote from a 1935 catalogue advertising wall thermometers: "'Len, it's like ice in this room.' Poor Len! Half an hour ago he had shaken the furnace and fixed the drafts. He knows the room isn't like ice. He also knows there's no use arguing with the Mrs., so he looks at the thermometer. It stands at 70 degrees and is a Taylor instrument. Even the Mrs. believes what it says. She never argues with it. But Taylor thermometers do more than keep peace in a family. They help keep a family healthy. Colds often result when we go from a warm room into a cold one.'" *A Catalog of Taylor Instruments* (Rochester, NY: Taylor Instrument Companies, 1935), Taylor Instrument Co. Papers.

<sup>205</sup> *The Tycos Book* (1927).

<sup>206</sup> *Ibid.* Such wall thermometers also ingratiated themselves into the home via their designs, which were meant to be unobtrusive, mounted on wood or enamel, and in "good taste."

actually mimicked Taylor's fever thermometers, which had similar red lines that indicated fever at little more than a glance.<sup>207</sup>

What's more, temperature was also invoked in the name of household efficiency, not only in terms of fuel economy but also in terms of the temperature most beneficial for productive activity. When sold, many Taylor thermometers came packaged with instructional booklets for users, and within was illustrated how to combine temperature taking with other healthful environmental practices. For instance, one advised opening the windows to "change" the air during times when a room is vacant; this, along with keeping the room at 68 degrees Fahrenheit, would create "conditions of greatest efficiency" for both adults and children.<sup>208</sup>

### Bath Thermometers

Particularly during the 1920s and 1930s, Taylor-made bath thermometers were also described as "essential to both health and comfort." One catalogue elaborated, "Water at a definite temperature is either stimulating or a sedative...from a psychological and therapeutic standpoint the most important characteristic of a bath is its temperature since a few degrees may entirely change the effect on the bather. The daily bath taken at a proper temperature safeguards health." Incorporated into this nineteenth-century notion

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<sup>207</sup> Although this chapter relies heavily on the archives at Taylor, its practices stand in for those of most major thermometer manufacturers. See the thermometer collections at the Dittrick Medical Museum and History Center, Cleveland, OH and the National Museum of American History, Washington, D.C., as well as the catalogue collection at the College of Physicians, Philadelphia, PA.

<sup>208</sup> *Temperature: Its Relation to Health & Comfort* (Rochester, NY: Taylor Instrument Companies, 1928), Taylor Instrument Co Papers.

about internal and external temperature relationships, though, is the imprimatur of a doctor's recommendation. The catalogue quoted a physician at length who extolled the healthful virtues of bathing in water of the proper temperature:

The healthful effects of the bath come from the temperature of the water. The water must be hot enough to relax strained nerves and it must be cold enough to quickly stimulate the circulation. It is the reaction of the change in bodily temperature that makes the bath a tonic or a remedy.

Additionally, the catalogue referenced the new public health campaigns waged by Progressive-era reformers that encouraged Americans to take daily baths for their best health.<sup>209</sup> Bath thermometers could likewise be used to test the temperature of hot water bottles to be used by sick family members.

But even moreso than for adults, proper bath temperature was considered to be especially important for children and babies.<sup>210</sup> In her work on seashore hospitals, historian Meghan Crnic has demonstrated both the widespread importance of healthful bathing practices well into the twentieth century, the multitude of medical ideas upon which they were based, and the various technologies that were brought to bear to make

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<sup>209</sup> *Thermometers: a Profitable Line* catalogue (Rochester, NY: Taylor Instrument Companies, 1922), Taylor Instrument Co. Papers.

<sup>210</sup> In addition to taking advantage of larger trends in consumption and advertising patterns of the early-twentieth-century, especially trends in targeting women as both housewives and mothers, new efforts in market segmentation sought to create consumer categories by age group. This further linked many aspects of consumer habits with expert-driven recommendations that derived from medical and associated professionals. See Cheryl Lemus on the creation of the infants' department in early twentieth-century department stores (which, of course, sold both bath and clinical thermometers for use specifically with babies), Cheryl Lemus, "Save Your Baby, Save Ten Percent: National Baby Week, The Infants' Department, and the Modern Pregnant Woman, 1905-1925," *Journal of Women's History* 25, No 3 (Fall 2013), 165-187.



properly scientific the bathing and other environmental therapies administered by doctors.<sup>211</sup> Taylor's bathwater thermometers worked to bring this combination of precision and environmental balance into the home, and to make mothers its implementers.<sup>212</sup>

Taylor sought to instantiate in their bath thermometers a more modern version of the popular "elbow test" for testing a baby's bathwater. Where domestic and parenting manuals from the nineteenth century had recommended that mothers test bathwater using their own bodies (typically an elbow, and occasionally a big toe), now thermometers were being encouraged. One catalogue elaborates, "The 'elbow' method of testing bath water is just not safe enough for baby. All books on baby's care, specify bath temperatures for the tender little rascals."<sup>213</sup> Popular parenting manuals from the period substantiate Taylor's claim, with many manuals specifying that a baby's bath water be held between 95 and 100 degrees Fahrenheit. For those that provided more general recommendations, Taylor also codified the common qualitative description of bathwater was "warm but not hot" into quantitative form on the body of its instrument. All of Taylor's baby bathwater

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<sup>211</sup> Meghan L. Crnic, "Seeking the Salubrious Sea: The Health and Environments of Urban American Families, 1870-1930," PhD diss., University of Pennsylvania, 2013. In addition to the specifically targeted work of thermometer manufacturers and the efforts of medical professionals, an entire industry developed around building the wider infrastructure to handle changes in American's bathing practices. *Modern Sanitation*, a journal for the plumbing industry funded by the Standard Sanitary Manufacturing Company, published articles on bathing, its history, its medical importance, and its optimization in nearly every issue. Hagley Museum and Library, Wilmington, Delaware.

<sup>212</sup> New innovations in plumbing, including hot running water, were infrastructural changes that also introduced new needs for testing bathwater temperature. Instigated by a changing regime in hygienic bathroom spaces — see discussion later in this chapter — this also introduced new dangers, including the possibility of accidentally scalding a child with water straight from the tap.)

<sup>213</sup> *The Tycos Book* catalogue (Rochester, NY: Taylor Instrument Companies), Taylor Instrument Co. Papers.

thermometers were labeled on side with a quantitative Fahrenheit scale and, on the other, in a corresponding qualitative scale using the most common subjective language used in parenting manuals from the turn of the century: hot, warm, tepid, “temp (an abbreviation of temperate), and cool. (See Figure 4.2)

Finally, Taylor also did a brisk business selling baby bath advertising thermometers to drug stores and other retailers who sold “all the hundred and one things that a baby must have.”<sup>214</sup>

Along with their floating bath thermometers that were engraved with a retailer’s name and logo, Taylor also bundled letters welcoming a mother’s new baby to the world. That way, as birth announcements were made or new births were recorded, businesses could immediately send letters and advertising thermometers to new families. And as they did the daily work of taking care of their children, they could be reminded of where to find all of the other goods they needed.

### **From the Black Bag to the White Box**

As decades passed, the nineteenth-century home fever thermometer with its engraved chatelaine case slowly gave way to simpler, more utilitarian designs. This shift, it is likely, may have been in part motivated by another trend in the home that was part of the material reconfiguration of mother’s work: the ascendance of the indoor, hygienic bathroom and, inside it, the medicine cabinet, where such tools were increasingly kept

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<sup>214</sup> *Taylor Advertising Thermometers catalogue.*

rather than being more continuously at hand on a woman's person or in other communal household spaces. In American life in the early-twentieth century, the medicine cabinet was both utilitarian object and emerging cultural symbol; its shelves were infused with Progressive values about hygiene, concerns over the dissemination of scientific motherhood, and the hopes of device manufacturers for an even more consumer-good-rich future for the American household.

Many household manuals from the era made recommendations regarding the home medicine cabinet:

In order to meet emergencies every home should keep a few standard remedies and the articles which will be needed when giving them. A plain cabinet which has a lock and key is a safe, convenient place for keeping medicines. The cabinet is usually hung rather high on the bathroom wall so that children cannot reach it.”

The home cabinet should also be clean, and sole-purpose.<sup>215</sup>

In the early 1930s, 10,000 New York City families were part of a study conducted by the Officer of the Commissioner of Accounts on the status of their home medicine cabinets. The report collected data about what kinds of drugs, tools, and other health care products the “average” family kept on hand for “first-aid treatment,” and it came to a troubling conclusion.<sup>216</sup> The average home medicine cabinet — what it saw as the first

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<sup>215</sup> Turner et al, *Home Nursing and Child Care*, 78. The appendix to this volume also includes a list of suggested supplies for stocking a home medicine cabinet, which includes many of the same supplies recommended by the Consumer's Project Bulletin Report. Ibid., 270.

<sup>216</sup> Rachel Lynn Palmer, *The Home Medicine Cabinet* (Washington, D.C.: Consumers Project, U.S. Department of Labor, June 1936), 1.

line of defense in the protection of the family — was quite poorly stocked. It was full of outdated medicines and drugs that could cause terrible side effects. Furthermore, it was usually missing several items that the report considered to be absolutely necessary.<sup>217</sup>

In response, the Consumers' Project of the United States Department of Labor commissioned a bulletin to educate families about proper home health care. It began:

The average medicine cabinet presents a formidable array of bottles, jars, and boxes. The crowded shelves may look like a miniature drug store, but still may not have on them those remedies which are best or most frequently needed for first-aid treatment in the home.

Especially problematic, the bulletin continued, was the fact that the contents of the average medicine cabinet was based on “commonly held ideas” about best health care practices that were “not based on sound medical facts.” The bulletin was meant to address this situation by providing families with a list of sixteen necessary items, which included drugs like pain relievers and burn applications, tools like hot water bottles and tooth brushes, and surgical devices like scissors and tweezers.<sup>218</sup> In so doing, the bulletin also reflected the way that the medicine cabinet was coming to collect and catalogue a certain kind of health care object in a new way: small, intimate technologies of the body. In the process of doing so, they also attached a particular set of social meanings and expectations to these technologies.

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<sup>217</sup> Ibid., 1-3.

<sup>218</sup> Ibid.

In the first half of this chapter, we saw how a thermometer manufacturer situated its own tools squarely within two sets of competing medical epistemologies. In the second half, we will explore an additional way that thermometers became integrated into daily practice at this intersection. The physical reality of the medicine cabinet helped to both create and mirror American's ideas about health, hygiene, the body, and bodily maintenance. And creation of a new kind of good — tools that belong in the medicine cabinet — helped to create a new kind of role for mothers, as the person who would wield those tools.

### **Medicine Cabinet as Miniature Drug Store**

The cultural narrative of the medicine cabinet has been one almost entirely of medical consumerism; the Consumers' Project report on the home medicine cabinet literally called the cabinet a "miniature drug store." Moreover, this consumerist impulse has sometimes been cast as technologically and scientifically determined. But, as historians of science have been quick to point out, the act of organizing and cataloguing objects has profound effects on how those objects are understood, valued, and ultimately used. The medicine cabinet is not a neutral set of shelves for household objects; in use and in effect, it is something much more akin (both literally and symbolically) to the doctor's black bag.

The medicine cabinet, as both the place where these objects live as well and the ontological category from which they operate, does important, unexamined work in

structuring the labor that women do in the home. What's more, the medicine cabinet is a crucial node in a sociotechnical network that obscures this labor in favor of a more consumerist approach. In addition to the rhetorical and economic ways in which patients are cast as consumers, the medicine cabinet materially reinforces this idea, placing home-based medical care — and those who perform it — firmly within the realm of the private, domestic, and commodified.

### **Moving the Box**

Prior to the twentieth century, medicine chests, cupboards, and shelves of various kinds were quite common, but they in little way resembled the bathroom medicine cabinet we are familiar with today. The move of the medicine chest from the kitchen to the bathroom wall occurred at the same time that individuals were expected to stop making remedies themselves and start using new antiseptics, professionally manufactured pain relievers, and scientific diagnostic tools like thermometers. At the turn of the century, Progressive era reforms brought a scientific, rationalized, and professional approach to all kinds of endeavors, including indoor plumbing. One of the results was the modern bathroom: efficient and discrete. When new home plumbing systems were combined with late-nineteenth century public health innovations like city sewage systems, it meant that the twentieth century bathroom was rapidly becoming the preeminent hygienic home health management space. While the standard late-nineteenth century bathroom generally only housed a bathtub, sink, and toilet, twentieth century bathrooms expanded to

incorporate fixtures like foot baths, showers, towel racks, cup holders, and planned lighting fixtures — all in the name of improved sanitation, household management, and efficiency.<sup>219</sup>

### **Medicine Cabinet as Mother's Tool Kit**

These changes were part and parcel of another sweeping change occurring in the United States during the Progressive Era: a widespread consensus gathering around the notion of a national, consumerist standard of living. Historian Marina Moskowitz has described how during the early decades of the twentieth century new national distribution systems for manufactured goods combined with a new advertising and advocacy infrastructure in order to create a particular aspirational standard of living that embodied progressive ideals in consumer products.<sup>220</sup>

James Thurber (perhaps inadvertently) explored the way that these ideals interacted in the middle-class living spaces of the American home in a short story that was published in *The New Yorker* in 1936, the same year that the Consumer's Project Report was released. After a brief introduction to set the scene, in which he was shaving in the bathroom of his good friends, he began his diatribe about the medicine cabinet:

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<sup>219</sup> Suellen Hoy, *Chasing Dirt: The American Pursuit of Cleanliness* (Oxford University Press, USA, 1996); Maureen Ogle, *All the Modern Conveniences: American Household Plumbing, 1840-1890* (The Johns Hopkins University Press, 2000). For more on changing technologies in the home and their relationship to ideas about modernity and gender performance, see Ronald Kline, *Consumers in the Country: Technology and Social Change in Rural America* (Baltimore, MD: Johns Hopkins University Press, 2000); Ruth Schwartz Cowan, *More Work for Mother: The Ironies of Household Technology from the Open Hearth to the Microwave* (New York: Basic Books, 1983); Marina Moskowitz, *Standard of Living: The Measure of the Middle Class in Modern America* (The Johns Hopkins University Press, 2008).

<sup>220</sup> Moskowitz, *Standard of Living*.

I am sure that many a husband has wanted to wrench the family medicine cabinet off the wall and throw it out of the window, if only because the average medicine cabinet is so filled with mysterious bottles and unidentifiable objects of all kinds that it is a source of constant bewilderment and exasperation to the American male...It may be that the American habit of saving everything and never throwing anything away, even empty bottles, causes the domestic medicine cabinet to become as cluttered in its small way as the American attic becomes cluttered in a major way. I have encountered few medicine cabinets in this country which were not pack-jammed with something between a hundred and fifty and two hundred different items, from dental floss to boracic acid, from razor blades to sodium perborate, from adhesive tape to coconut oil.<sup>221</sup>

The rest of the story surrounded the protagonist's frustrations when, after opening the cabinet, nine sewing needles fell into the sink. He attempted to retrieve them using all kinds of objects that repeatedly hit him as they cascaded out of the cabinet, including a toothbrush, iodine, and lipstick.

What is telling about this story is the way that the comedy would have depended utterly on the trope (still familiar to us today) of the ludicrously overstuffed medicine cabinet — Thurber's bumbling was acutely funny precisely because of its relatability. Yet despite the situational comedy, none of the items on their own would have seemed particularly out of place; the razors, the adhesive tape, the sewing needles, and the

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<sup>221</sup> James Thurber, "Nine Needles," *The New Yorker*, January 25, 1936, 17.



toothbrush are the small-scale equivalents of the household fixtures that Moskowitz describes. They fit comfortably within the class of consumer goods that embody nebulous cultural values of health and hygiene, and they contribute in specific ways to the maintenance of proper modern bodies.

The story is also a compelling case because of the way it specifically painted the American male as the person frustrated by the medicine cabinet. The narrator saw this assemblage of goods as somewhat more upsetting or confusing than would have the American female — or, more specifically, than he imagined that the American female might find it. This framing is initially peculiar; the objects that fell out of the cabinet in the story (e.g. razors, bandages, toothbrushes, etc.) were largely not ones that have uses that have been culturally coded as specifically feminine. But what the narration makes clear is that what has been coded as female is the category of the medicine cabinet.

While scholars have long explored the domestic sphere as the palate for American women's consumerist expression, the private space of the medicine cabinet resists these characterizations. Its intimate position as a closed space within the already private space of the bathroom makes it a far less attractive canvas for displaying one's purchased goods. The role of the cabinet is clearer when we see it not as just a container for consumables, but as an organizing place and category of work tools, where the work in question is domestic medical stewardship. The woman of the house is presumably the one who gathers, organizes, and is in charge of the tools of home body work. What Thurber's story illustrates is the extent to which the American medicine cabinet has demanded the attentive work of these female family members — one of the reasons why the

overflowing medicine cabinet trope has so widely proliferated is precisely because we know that it needs careful maintenance in order to work properly. Consequently, it is the women of the house who are blamed when it does not.

In the Consumers' Project Report discussed earlier, there is another example of the trope of the poorly stocked medicine cabinet, but in this case the narrative was a much more serious and cautionary one. The story began with a tale of a small boy running into the family home with a badly scratched knee, but when he arrived inside for help there was no antiseptic to be found in the medicine cabinet. There was, however, a two-year-old bottle of cough medicine readily (and uselessly) at hand.<sup>222</sup> His mother knew that maintaining the family's medicine cabinet was a crucial responsibility, but it was also a complicated and time consuming one. The report made it clear that the mothers of America were in need of expert instruction on the subject.

Although the explicit purpose of the Report was concerned with consumption — it was literally a guide of things to buy and have on hand — practically it read far more like a training manual, communicating to the nonexpert the practical knowledge of professionals about what kinds of medicines to use and how. It contained explicit details about not only products and brands, but also step-by-step instructions on when and how to use them in order to be the most capable and responsible parent possible. Being proficient in the use of the medicine cabinet was considered to be a crucial step in the molding of a healthy family.

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<sup>222</sup> Palmer, *The Home Medicine Cabinet*.

According to Moskowitz, engineering the family home — or, more exactly, the house — was a further, and explicit, way in which this virtuous ideal was perpetuated.

She writes

At the heart of the organization of middle-class spaces, whether domestic or public, was a belief in environmental determinism, that the material world not only reflected the status of those who lived in it, but could in fact help shape that status...Objects and spaces were freighted with, and thus carried, significant values of middle-class life, such as the importance of etiquette and social codes, privacy and interiority, investment, and careful management.<sup>223</sup>

This sentiment, too, seems to go beyond mere consumerism, even an America consumerism that has been inextricably tied up in citizenship, social values, and belonging. There is a strong engineering and management ethos in Moskowitz's description of the environment of the home; for a certain class of postwar American, an ideal material world not only displayed their social position but also played a role in creating it. Objects and spaces were seen to be so powerful in affecting the lives of their users and inhabitants that citizens needed to be active in managing the materiality of their lives. It was not uncommon for domestic and parenting manuals of the period to include extensive lists and appendices detailing which products to keep stocked, organized, and in well-working order.<sup>224</sup>

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<sup>223</sup> Moskowitz, *Standard of Living*, 18.

<sup>224</sup> See, for example, Turner, et. al., *Home Nursing and Child Care*.

Thermometer manufacturers, for their part, also excitedly adopted the medicine cabinet as a functional container and as a symbolic expression of the thermometers function and importance. Taylor Instruments and Becton-Dickinson, one of Taylor's manor competitors, each independently designed thermometer display cases for their products that were in the form of medicine cabinets. Both used messaging that was familiar from Taylor's other advertisements — "know when to call your doctor" — and although there was some upset from Taylor about the overlap in advertising strategies, they eventually conceded that the uniformity in message might be advantageous. After all, the message of both campaigns was that no medicine cabinet — and by extension, no home — was complete without a fever thermometer.<sup>225</sup>

Approximately a decade before Thurber's story was published, *Popular Science Monthly* published a non-fictional article in 1925 titled "First Aid For Your Family." Written by Dr. John F. Anderson, former Director of the Hygienic Laboratory of the U.S. Public Service, the article focused explicitly both on medicine cabinet design and contents: "The household medicine cabinet should be the best lighted part of the bathroom, and so placed that when the mirror-fronted door is open, a light shines full upon its contents. It should be painted and kept in spotless white, and its shelves should be of glass."<sup>226</sup> Instructions for supplying the cabinet were also provided.

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<sup>225</sup> Taylor weekly sales letter (September 19, 1947), Taylor Instrument Co. Papers.

<sup>226</sup> John F. Anderson, "First Aid for Your Family," *Popular Science Monthly*, February 1925, 54.

Anderson incorporated explicit scare tactics into his appeal for proper medicine cabinet management. The subheadline to the article read “What you should keep in your medicine cabinet for every emergency — How to safeguard against mistakes,” and Anderson warned of the possibility of mistaking a dangerous drug for a harmless one in an unorganized or poorly lit cabinet. Furthermore, he chastised readers against keeping items in the cabinet that the family physician “would not approve,” emphasizing that the medicine cabinet was no mere storage device.<sup>227</sup> The article communicated the clear hierarchy of expertise that was embedded in the medicine cabinet. By labeling this collection of hygienic, health-related objects as explicitly medical, physicians and technology producers were able to claim authority over their deployment, which they then communicated to users. In response, as lay individuals began to incorporate their advice and tools into their intimate lives, they also adopted the impulse to properly (i.e. in accordance to expert advice) manage their tools and their bodies.

Readers of Anderson’s article may have recognized and enacted this impulse in a contest held by the same publication sixteen years later. In 1941, *Popular Science Monthly* held a contest for readers to design the ideal bathroom medicine cabinet. The contest was incredibly popular by their own standards; they awarded five prizes (one more than originally planned) and 22 honorable mentions, and they featured the five winning medicine cabinets in a full spread in the magazine. The article was accompanied by stylized representations as well as schematic design drawings of the winners, and it

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<sup>227</sup> Ibid.

included descriptions and explicit encouragement for readers to attempt to build the cabinets for themselves. A special award was made for a contest submission that was accompanied by photographs of a cabinet that the entrant had also constructed.<sup>228</sup> (See Figures 4.3 and 4.4)

The features of the submitted cabinets give us a sense of how individuals were using their home medicine cabinets by showing us how they wished they could improve that use. For instance, one of the most popular desired innovations among contest participants was for a medicine cabinet with an interior mirror as well as exterior one; this should be accompanied by a design of doors, shelves, and drawers that would maximize the usefulness of those mirrors. Designers also wanted more shelf space, more lighting, electrical outlets, and specialized holders and containers for devices like scissors, tweezers, and tissues. The winning entry also had additional “his” and “hers” shelves on either side of the main cabinet in order to eliminate gender conflict over space for items specifically designed for personal grooming. Runner-up medicine cabinets had even more specialized containment innovations: sterile drawers for first-aid supplies, shelves with different shapes for a multitude of bottles and jars, compartments designed especially for electric razors, etc. One design even included a special locked compartment for “dangerous drugs,” simultaneously recognizing that “toilet items” and medical

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<sup>228</sup> “Prize-Winning Medicine Cabinet,” *Popular Science Monthly*, May 1941.

supplies belonged in the same physical and ontological space, and that in order to share this space effectively they had to be quite carefully managed.<sup>229</sup>

Far from reading like a lifestyle magazine or a shopping guide, this contest clearly portrayed the medicine cabinet as a utilitarian object that its users wished to scientifically master. They showed a keen awareness for the values embedded in the object — clean lines, hygienic sterility, efficient organization, and targeted clarity — that were in turn transferred to the tools within it and the bodies that those tools altered. According to the headline, the winning cabinet was “as modern as tomorrow”; so, too, would be the people that it helped create.

### **“Keeping Comfortable”**

It was not only health, the environment, and work that thermometers and their proponents merged: modernity and, just as importantly, comfort became additional watchwords that signaled the role of the thermometer:

If the cave man, or the primitive denizen of the forest who sought refuge from the ‘weather’ in a lean-to, were to peep into the window of a modern dwelling he would not understand what he saw...Look into the modern home and see its comforts. One steps in out of the storm and at once notices the pleasant ‘feeling’ of the room.

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<sup>229</sup> Ibid.

In the modern home, the thermometer kept the house cool but not chilly. It kept the housewife economical in cooking. It kept the air, water, and body in regulated harmony in the bathroom. It is, as they said in one booklet, “a lesson of man’s success in the battle with Nature.”<sup>230</sup>

Modernity, comfort, health, efficiency, productivity: all are elided in the space of the early-twentieth-century home. All are served by the thermometer, which brings those values into daily practice and, furthermore, into the body. The same booklet that boasted about man’s victory in his battle over Nature also compared the role of heat and cold in the human body to that of an automobile. By this point in the history of thermometry, it had become common to compare the human body to various machines to illustrate the mechanistic importance of temperature to our functioning — and, in no small part, to illustrate our own control and mastery over it. Just as we can take care to avoid the overheating and overcooling of our car’s engine, so too can, and should, we take the same care with our “human engine.”<sup>231</sup> To do so is the best, nay the only, way for us to work.

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<sup>230</sup> *Temperature: Its Relation to Health & Comfort* (Rochester, NY: Taylor Instrument Companies, 1928), Taylor Instrument Co. Papers, . This language of battling with Nature, interestingly, is a marked change from an earlier edition of this booklet, from 1912, in which it discussed rather how Man must “supplement Nature’s ingenuity” with his own.

<sup>231</sup> *Ibid.*



## Chapter Five

### **“Walking Biological Computers”: Temperature Tracking and the Creation of a Cybernetic Subjectivity**

In the 1960s, S. Carl Hirsch was an award-winning author and graphic artist who wrote popular books for children on the environment, technology, and biology. In *This is Automation*, Hirsch (with the aid of experts from the fields of scientific education, educational policy, and industry, including employees of IBM and the Univac Division of Sperry Rand) explained to an audience of children the concept of feedback in industrial instruments. He used the example of a paper mill which rolls paper out at a rate of 30 miles per hour. As the paper is being rolled out, testing machines take repeated readings to ensure that the thickness of the paper is correct; if the readings show that the paper is too thick or too thin, the machine can then adjust its speed accordingly to compensate.<sup>232</sup>

Hirsch summarized, “At the very moment that the product is being made information about it is being fed back into the automatic correction machinery. The name for this process is simple and descriptive: it is *feedback*.” In the middle of the page, illustrator Anthony Ravielli drew a picture of a man with a thermometer sticking proudly out of his mouth. Hirsch continued, “Feedback is something like a patient checking his own temperature and then taking an aspirin if he has a fever.”<sup>233</sup> The section on feedback

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<sup>232</sup> S. Carl Hirsch, *This is Automation* (New York: The Viking Press, 1964), 63.

<sup>233</sup> Ibid.

was included in a chapter titled “C for Controlling,” which began with a “nightmare” scenario of the machines in a factory making a single mistake which rapidly amplified, in the style of the sorcerer’s apprentice, until it had produced a pile of defective goods.<sup>234</sup>

The metaphor of keeping watch over bodies and machines is familiar from previous chapters, but in this case the metaphor has flipped. While in the 1920s Taylor admonished that people must keep watch over the bodies as they would a vehicle (they described the human heat processes as the “human engine”), by the 1960s it was common to refer to machines — especially factory machines — in the terms of a metaphor that described those machines as akin to a biological human system. (It is important to also notice here how the circuit of human and thermometer is conceived as natural and domestic, simple and accessible enough for a child to understand.)

In this chapter, I will explore the implications of such a reversal in metaphor as it relates to the midcentury science of cybernetics and its lasting impact on fertility trackers’ subjectivity. I will conclude by showing how this closed metaphor turns at least twice more, with women coming to know their bodies as computers, and with twenty-first century app developers comparing their internal algorithms to the natural processes of a woman’s “body” (i.e. her body in conjunction with its associated, naturalized technologies).

Every time a thermometer went home in a woman’s hands it became naturalized,

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<sup>234</sup> Hirsch’s use of the sorcerer’s apprentice as an analogy is both appropriate for his audience of children (especially given the use of Micky Mouse to play the sorcerer’s apprentice in the 1940 Disney film *Fantasia*), and a reference to Norbert Wiener, who used the sorcerer’s apprentice as an analogy in many of his writings. See, for example, Norbert Wiener, *The Human Use of Human Beings: Cybernetics and Society* (Boston, De Capo Press, 1988), 129.

and once naturalized it became a resource for being turned into another metaphor for how machines should work. Each new metaphor assumes and codifies as not just given but also normal, natural, and inevitable the particular organization of parts and processes involved. Not only does this erase all of the tacit knowledge and work that goes into making the supposedly natural system work in a regular way, it makes it more difficult to extract our technology and ourselves from the material and conceptual apparatuses that have been built to hold them. This, then, has the added potential of forestalling critique: one can't pull at a thread if it will dismantle the fabric. Every new turn of this closed metaphor makes it more difficult to claim that a quantified self is not now the only kind of self to have. In this continually turning circle, the thermometer continues to act as the boundary object through which these conceptions are altered and perpetuated. I will argue that a subjective tension emerges when women simultaneously care for their bodies in ways that are rooted in "naturalness" and yet also attempt to avoid their own embodiment by focusing on machine metaphors.

Emily Martin has explored the medical metaphors that surround women's bodies, particularly the way that metaphors of the factory have influenced medical science.<sup>235</sup> From the level of cellular proteins to the labor of childbirth, the factory metaphor has had poignant and damaging effects. Particularly with respect to menstruation, the factory metaphor has pushed interpretations of women's bodily processes toward being stories of

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<sup>235</sup> Martin also does an extraordinary job of cataloguing the numerous ways that the women she interviewed have felt disembodied and removed from themselves, in part due to the language that surrounds the birth process. Emily Martin, *The Woman in the Body: A Cultural Analysis of Reproduction* (Boston: Beacon Press, 2001).

failure: she quotes a biological text that discussed the “degeneracy” of the corpus luteum, tissues that were moved to “degenerate,” “weakened” capillaries, and an endometrium in need of “repair.” This is indicative of a larger cultural bias toward production (specifically, capitalist production); a “kind of horror for us is *lack* of production: the disused factory, the failed business, the idle machine.”<sup>236</sup> Even when pregnancy has been achieved,<sup>237</sup> the factory model continues to emphasize the mechanical work done by a woman’s body (e.g. the uterus contracts) as an independent force separate from the woman’s own agency.

Building on Martin’s work, I also ask how women have responded to scientific metaphors about their bodies. By looking at the continuing circuit of the closed metaphor between body and machine, I show how these metaphors do boundary work that is similar to that of the thermometer. Women draw epistemological guidance from scientific metaphors, but as those metaphors proliferate culturally they also in turn feed new, slightly altered metaphors back into new scientific disciplines.<sup>238</sup> In the next section, I will explore the ways that the naturalized couplet of patient-and-thermometer came to do important work for cyberneticians in the midcentury as the supposedly natural basis for their ideas about organic-machine systems, including programmable computers. In turn, as fertility tracking aged during the turn of the twenty-first century, many women

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<sup>236</sup> Martin, *Woman in the Body*, 47.

<sup>237</sup> Such fraught linguistic characterization!

<sup>238</sup> For more on cybernetics’ claim to universality, see Geof Bowker, “How to Be Universal: Some Cybernetic Strategies, 1943-70,” *Social Studies of Science* 23, No. 1 (February 1993), 107-127.

began to refer to their bodies as akin to computers. And in a final turn, in the 2010s application developers and big data enthusiasts have started to use fertility trackers' bodies, and the way their bodies synthesize the "information" they "produce" as the natural form that their algorithms are modeling.

### **"Modern life is based on control and science"**

A circa 1938 poster for the Birth Control Clinical Research Bureau featured four scenes of life. Next to a zooming car, a title read, "We control the speed of our automobile." Next to a set of interconnected gears: "We control machines." Next to a patient in a hospital bed, there is a table filled with bottles and an attendant carrying another: "We endeavor to control disease and death." And finally, next to a heteronormative family of five: "Let us control the size of our family to insure health and happiness." These four scenes take place under the banner, "Modern life is based on control and science."<sup>239</sup> (See Figure 5.1)

Approximately a decade later at a series of conferences sponsored by the Macy Foundation, a new science of cybernetics was begun by a group of interdisciplinary scholars led by Norbert Wiener, a mathematician from MIT. Cybernetic sciences were organized around the principle of feedback, and the thermostat is made much of as an exemplar cybernetic device: it reads the temperature of a room, compares that to an ideal, and adjusts the heat output of the furnace accordingly. But Norbert Wiener himself also

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<sup>239</sup> Abraham Stone Papers, 1916-1959. H MS c157, Harvard Medical Library, Francis A. Countway Library of Medicine, Boston, Mass.

used the example of a human body as another homeostatic example: he wrote that if a human's body temperature deviates even just one degree from 98.6 degrees Fahrenheit, our various bodily "mechanisms" act to bring our temperature back to normal.<sup>240</sup> Yet even in his comparisons to the entirely organic model system of the human body, Wiener was largely oblique about the external, technological inputs that might enter into the system to do the work of maintaining it. He wrote that a person would "begin to take notice of it" if their temperature deviated by a single degree — but this could only be true if that person were (regularly) monitoring their temperature with a thermometer, as a temperature variation of a single degree is not usually detectable without one. (Wiener also does not mention the many technological interventions that his hypothetical person might employ to bring their bodily "mechanisms" back to normal in the event of serious deviation.)

In an article titled "Where are the Cyborgs in Cybernetics?," Ronald Kline has shown how, while cyberneticians "focused on the analogy between humans and machines," they did not generally, at least at first, focus on developing cyborgs, i.e. organic-technological hybrids.<sup>241</sup> Yet, as he and other scholars like Katherine Hayles have shown, over time the cybernetic mechanism (a wholly technological system, a robot without organic element but based on a living model) transformed in public consciousness into the cyborg, a hybrid of technological and organic components that

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<sup>240</sup> Wiener, *The Human Use of Human Beings*, 96.

<sup>241</sup> Ronald Kline, "Where are the Cyborgs in Cybernetics?" *Social Studies of Science* 39, No. 3 (June 2009), 331-362, 333.

nevertheless still functioned cybernetically, i.e. according to the principles of feedback between elements.<sup>242</sup> Kline illustrates this with an example from a May 1960 *New York Times* article defining a cyborg as “a man-machine system in which the control mechanisms of the human portion are modified externally by drugs or regulatory devices so that the being can live in an environment different from the normal one.”<sup>243</sup>

A similar transition happened in the self-conceptions of natural family planners. The scenes above from the 1938 poster, in which a vehicle, a set of gears, a sick patient, and a happy family are set in parallel as objects of human mastery, were by the 1980s forgone in favor of iconography that merged technology with women’s bodies. The analogy of the of earlier artwork had become synthesis. In feminist health journals, women grappled with feeling like their bodies were in some ways technology, and they struggled with the process of maintaining them. These images appeared in *Women: A Journal of Liberation*, accompanying an article written by a group of women representing the Fertility Consciousness Group of Cambridge, Massachusetts. The first showed a woman opening her torso like a door, revealing within her body a cavity much like a wall filled with a tangle of water pipes. Another, drawn by Laura Chasey of Arlington, VA, shows a magnified woman’s torso spread on a bed, resembling a dressed chicken but with a clock where her head might sit.<sup>244</sup> (See Figures 5.2 and 5.3)

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<sup>242</sup> N. Katherine Hayles, *How We Became Posthuman: Virtual Bodies in Cybernetics, Literature, and Informatics* (Chicago: University of Chicago Press, 1999).

<sup>243</sup> “Spaceman is Seen as Man-Machine,” *New York Times* (May 21, 1960), cited in Kline, “Where are the Cyborgs in Cybernetics?”

<sup>244</sup> Boston Women’s Health Book Collective Records, Schlesinger Library, Radcliffe Institute, Harvard University.

This slippage, which allowed some feminists to visualize their bodies as machines and some cyberneticians to visualize machines as bodies, has implications for the ways that values become embedded in both our technology and our biology. When machines are spoken of as bodies, they become naturalized; it becomes easy to imagine they are inevitable, and that their form is predetermined. When bodies are spoken of as machines, it implies that they are predictable, knowable, and controllable.

In the cultural milieu established in the previous chapter, in which control and management of one's internal and external environment is a crucial component of health and a mandatory component of motherhood, these metaphors and the values they encoded created real stakes for fertility trackers in terms of their sense of self and their own responsibility to manage their bodies. This was only further exacerbated by mid-century trends in medical practice that turned the responsibility for bodily control inward and actively dismantled the material and social infrastructure that enabled unruly bodies to function while still being unpredictable.<sup>245</sup>

For danah boyd, a prominent scholar who studies the intersection of information technology and society, this struggle for bodily control came to head during a period of

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<sup>245</sup> For an incredibly compelling example, see Rachel Elder's forthcoming dissertation on the cultural history of seizures. She describes the ways that pharmacology offered a private solution to the problem of seizures, allowing epileptics to function more independently in the world. At the same time, such "revolutions" in medicine resulted in the destruction of specially-designed schools and other institutions in which the built environment supported epileptics without the same onus of an elusive personal responsibility. Rachel Elder, "Secrecy and Safety: A Cultural History of Seizures in America, 1930-1960," Unpublished manuscript.



lengthy illness that she described on her blog:<sup>246</sup>

Two years ago, when my body went to hell and I spent months in a whirlwind of migraines, vertigo, fatigue, and all-around misery that doctors couldn't diagnose, I turned to tools and techniques... [to track] the symptoms I was experiencing, my menstrual cycle, and my weight. I used a Fitbit to keep tabs on every step I took and to monitor my sleep...I started seeing patterns in my health and found the patterns really helpful as I experimented with non-invasive, non-chemical solutions to my various body woes.<sup>247</sup>

boyd engaged in a type of information gathering and analyzing that would have been right at home with the work being done by Jacobi and her patients in the nineteenth century, with the exception of her access to computerized tools for analysis. But where Jacobi repeatedly emphasized that women's bodies were not disabled by their bloody particulars, boyd has a much less positive view of her own embodiment:

Truth be told, I'd much rather be a cyborg or a brain on a stick. I prize my brain, but the rest just tends to get in my way, break down, or reach annoying limits...I know.. this is a terrible way to think about it – and doesn't actually make any

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<sup>246</sup> boyd has an extensive set of critical credentials and experience exploring the social ramifications of technology: she received her Ph.D. from the School of Information at UC-Berkeley, her Master's at the MIT Media Lab, and her B.A. in computer science at Brown. In some ways she sits at the intersection between professional engineers and the lay women whose experiences will make up the rest of this chapter.

<sup>247</sup> danah boyd, "omg girls' bodies are fascinating: embracing the gendered side of quantified self," danah boyd | apophenia, enter posted October 1, 2012, <http://www.zephoria.org/thoughts/archives/2012/10/01/quantifying-girliness.html>. The post has also garnered a significant number of comments from women who share their own insights and experiences.

sense given that the brain isn't separable from the rest of me – but this is my sci-fi fantasy.<sup>248</sup>

boyd's cyborg desire revealed an important element of the cyborg fantasy that science fiction and cybernetic science had wrought. Not only was her vision idealized — she wrote as if machines are not just as prone to breakdown as bodies — but it also was genderless. Or, to be more precise, her cyborg desire was not female; she placed herself firmly opposed to any bodily factors that she considered to be coded feminine, with the attendant irritation and social expectation that come with that designation. Despite tracking nearly any and every biological element that she could think of (including the dates, but no other quality, of her menstruation), boyd resisted tracking any metrics concerning dieting, for example, or any metrics concerning fertility. She wrote, “One of the manifestations of my feminist-y anger with our body image-obsessive culture is to want nothing to do with calories or dieting or other activities that position the female body in an objectifiable state...”<sup>249</sup>

But boyd eventually changed her mind on this point, after talking with a new doctor. She described to her doctor the different metrics that she was using in order to investigate her various health problems. In response, her doctor pushed back, asking why she was tracking sleep, food, her weight, and even her menstrual cycle, but not other physiological signs that are often linked more explicitly with fertility. Body temperature,

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<sup>248</sup> Ibid.

<sup>249</sup> Ibid. She seemed, however, even eager to embrace the objectification of qualities that had to do with her body that were not in her estimation gendered female.

she explained, acts as a proxy for the internal hormonal changes of a woman's menstrual cycle. After the doctor was through explaining these hormonal changes in more detail, as well as the effects that they can have throughout the whole body, boyd was eventually convinced to track the signs of her fertility, in addition to all of the other things that she was tracking. She bought a special basal body temperature thermometer, did some research, and started monitoring.

She continued in the post,

I still want to be a cyborg. I'd still much rather not have to deal with my period, food as fuel, or the crazy chemicals that seem to dictate so many things. But, given that I'm stuck with this body, I really wish that I had started tracking the chemical and hormonal cycles two years ago when my body was all out-of-whack. Heck, I wish I had started monitoring these patterns a decade ago. I get why monitoring hormones is associated with fertility – and I suspect that most people who ever monitor such things will be looking to conceive – but I wish that the practice weren't so laden with the cultural associations that prevented me from looking in the first place. And I wish that the quantified self movement would recognize hormone tracking and not see it – and fertility writ large – as an othered category.<sup>250</sup>

Her continual distancing from anything coded as feminine — along with her desire to be rid of her body all together — revealed an affinity with technology that clearly privileged

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<sup>250</sup> Ibid.

the values that had been embedded within the idea of technology. Technology, she believed (emotionally even if not intellectually), would not break down on her in the same way that her human body did; she could know how a cyborg body worked and how to control it; a cyborg body would not have to be feminine.

boyd's desire to be cyborgian is predicated on the idea of a cyborg as a perfect homeostatic system, an idea that Norbert Wiener described as predicated on the idea of a functioning human body.<sup>251</sup> This idea is itself predicated on the idea of a human body that works just like a vehicle or a set of gears in a factory. Her desire to be a cyborg belies the fact that she is, already, a cyborg: a human component of a feedback system that includes her extensive self-tracking technologies.

Donna Haraway's writing experienced a similar slippage in her "A Manifesto for Cyborgs." In this work, she described that all people are, in fact, "fabricated hybrids of machine and organism." "This cyborg," she writes, "is our ontology; it gives us our politics...the relation between organism and machine has been a border war. The stakes in the border war have been the territories of production, reproduction, and imagination."<sup>252</sup>

Haraway saw our emerging cyborg ways-of-being as an opportunity to remake fundamental categories of existence: an opportunity for a new kind of subjectivity to

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<sup>251</sup> Wiener, *Human Use of Human Beings*. The elaboration of the idea of homeostasis and the primacy of body temperature regulation comes from American physiologist Walter Cannon's work *The Wisdom of the Body* (New York: W. W. Norton & Company, 1932).

<sup>252</sup> Donna Haraway, "A Manifesto for Cyborgs: Science, Technology, and Socialist Feminism for the 1980s," *Socialist Review* 80, No. 15 (March-April 1985), 65-107.

emerge, one that would resist binary and dichotomous characterizations, one that would always have been technological and natural, private and public, such that any distinctions between characteristics would be meaningless. In the discursive mode of the closed metaphor that I have described above, Haraway's reading makes a certain kind of sense. The more we turn around and around in this metaphor, the less meaning it seems to hold, and the more opportunity there might be to imagine our constituent parts and the selves they make differently.

Yet Haraway also seems to evade the connection between a-reproductive cyborg practices and reproductive cyborg practices, sidestepping the fact that non-discursive cyborgs really do come from somewhere, some combination of womb and factory. Haraway acknowledges the *militaristic* origins of our cyborg selves in the developments of technologies of warfare, but claims that cyborgs are inherently capricious and unfaithful to their origins — in part because she imagined that they someday might not be born of two differently-sexed parents in the traditional modes. New cyborgs, she claimed, could come into the world through a process more akin to the regeneration of a lost limb; cyborgs are an adaptation, using whatever resources available.

But I argue that it is not so easy to shake off the literally reproductive origins of our cyborg, cybernetic selves.<sup>253</sup> Women's labor using thermometers, in their capacity as

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<sup>253</sup> Here my critique of Haraway is similar to that of Peter Galison, who argues that Haraway does not sufficiently acknowledge the military origins of cyborgs and their military "associations." Peter Galison, "The Ontology of the Enemy: Norbert Wiener and the Cybernetic Vision," *Critical Inquiry* 21, No 1 (Autumn 1994), 228-266. My argument, however, is slightly more material; it is not only cybernetics' "association" with military tactics that make the idea of a cyborg free of historical influence impossible, it is that there is a history of technology use that — being necessary to the existence of living beings, even partially technological ones — can not be erased.

mothers, potential mothers, and those avoiding motherhood, has contributed to a foundation of knowledge and epistemic claims in science and medicine, from building the standardizable bodies of their children to contributing to biology's picture of what Warren Weaver called a "new science of man."<sup>254</sup> If cyborg epistemology was developed in part from the process of controlling women's work and their biological fertility, can it ever really be divorced from the women's bodies upon which it was built?

### **Creating a Cybernetic Subjectivity**

Manuals of fertility tracking practices are incredibly evocative objects, testaments to the practices of the women who have written them and who swear by them. Part memoir and part instruction manual, they're replete with the personal reflections of their authors and with narratives describing the experiences of other fertility trackers.<sup>255</sup> Some contain highly technical and dense chapters on reproductive physiology. And others take on more of a workbook style, like *The Art of Natural Family Planning*, which is organized into instructive chapters that are followed by brief sets of self-test questions.<sup>256</sup> Part of this skill building repertoire are sample charts that women can use to practice their

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<sup>254</sup> Clarke, *Disciplining Reproduction*, 5.

<sup>255</sup> For three particularly compelling and popular examples, see Aguilar, *The New No-Pill No-Risk Birth Control*.; Katie Singer, *The Garden of Fertility: A Guide to Charting Your Fertility Signals to Prevent or Achieve Pregnancy - Naturally - and to Gauge Your Reproductive Health* (New York, NY: Avery, 2004).; Toni Weschler, *Taking Charge of Your Fertility: The Definitive Guide to Natural Birth Control, Pregnancy Achievement, and Reproductive Health* (HarperCollins, 2006).

<sup>256</sup> *The Art of Natural Family Planning* is the official manual of the Couple to Couple League, a Catholic organization with the mission of spreading information about fertility awareness around the world. John F Kippley and Sheila K Kippley, *The Art of Natural Family Planning* (Couple to Couple League International, 1996).

interpretation skills. For example, on one such chart there are two points at which a woman might interpret a temperature shift as occurring — there is a temperature that almost reaches a high of 98 degrees Fahrenheit followed by two lower temperatures and subsequently several even higher ones. Readers are intended to refer back to the instructional chapters and attempt to pinpoint the moment of ovulation on the chart.

In the answer key, the authors remind their reader that these kinds of variations on temperature charts are common, but that their manual contains methods to mitigate the confusion caused by such variation. For example, there are several complicated sets of mathematical rules whereby, if certain conditions are met, women are given the latitude to “shave” individual anomalous points off of their temperature curve in order to make better sense of the graph.<sup>257</sup>

Over time, many fertility trackers have replaced the hand drawn temperature charts of midcentury with electronic charting software, either on their computers or portable electronic devices.<sup>258</sup> This process is often visible in close to real time on numerous online temperature tracking communities, where women upload their charts for other community members to view and interpret. In one particular user's chart, posted in

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<sup>257</sup> Ibid..

<sup>258</sup> These sets of software and mobile applications are one of the largest and fastest growing segments of the computer and smartphone application market. They are part of a set of trends that are referred to as, among other things, the quantified self movement, lifelogging, m-health (or mobile-health), and healthstyle technologies; all involve collecting data about one's body for analysis and optimization. Menstruation and fertility tracking software have long been at the forefront of these types of technology; “period reminder” email services like “MyMonthlyCycles” and “MyNextPeriod” have existed for decades, and natural family planning software was developed for devices like Palm Pilots well before the iPhone spurred the market. See the program “NFP” developed by Chad Brassil for PalmOS, Tucows Software Library, Internet Archive, [https://archive.org/details/tucows\\_303990\\_NFP](https://archive.org/details/tucows_303990_NFP).

2012, there are multiple peaks and valleys on the temperature line. The woman who shared this chart with the community was asking for help concerning the confusion this posed. The temperature tracking software that she was using calculated that, according to its analysis of the data she had entered, she had ovulated on day 19 of her cycle. (The software indicated this with an egg-in-a-nest icon and by highlighting the column for that calendar day.) However, she was not sure that she trusted the software — to her, it looked as though ovulation may have occurred later, extending her fertile period several days beyond what the software determined. To help her make sense of things, she posted her chart to an online gallery, where several other women commented with their interpretations.<sup>259</sup>

This fertility tracker read her body with an instrument, inscribed that data on a chart, interpreted that chart ambiguously with her own mind, interpreted it again via machine, and interpreted it again through the shared experience and expertise of a community of fellow practitioners. Then, she took action based on this analysis: she

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<sup>259</sup> “Taking Charge of Your Fertility Gallery”, n.d., [tcoyf.com](http://tcoyf.com). Where I am reporting the experiences of women who have shared their stories on online forums, I have done my best to anonymize them (including not using their name or providing the URL for their specific posts). While their writing and fertility charts are available publicly online, they were posted within a context of community sharing. As such, I have done my best to summarize their experiences accurately without making them easily identifiable. I have taken much guidance from Helen Nissenbaum’s context of contextual integrity, elaborated in Helen Nissenbaum, “Privacy as Contextual Integrity,” *Washington Law Review* (2004). For more on the methodological and ethical considerations of performing virtual ethnographies of online medical conversations, see the Introduction.

A 2012 study by researchers at the University of Oxford and University of Glasgow investigated the health effects of patients using the internet to share their experiences of illness with one another. They found that such behavior affected nearly all aspects of patients’ illness experiences, including how they gathered information, how they visualized their disease, the degree to which they felt supported in their challenges, the language they used to conceptualize and describe their health, and the actions that they eventually take. These researchers do not, however, draw larger conclusions about the nature or implications of this collection of behaviors. Sue Ziebland and Sally Wyke, “Health and Illness in a Connected World: How Might Sharing Experiences on the Internet Affect People’s Health,” *The Milbank Quarterly* 90, no. 2 (June 2012): 219–249.



decided to lengthen her interpretation of her fertile period during her following cycle to include more later dates, and she and her husband continued actively trying to conceive during that time.

As the intricate instructions of the workbook and the complicated practice of the fertility tracker above reveal, natural family planning is time-consuming and incredibly technical. It also requires significant resources in terms of tools, education, tacit knowledge, and community support. Understanding it as a socio-technical system reorganizes our traditional understanding of how knowledge and bodies get created and disciplined. Many fertility trackers are quick to discuss the wider-reaching social and political implications of their actions in terms of their relationships with institutions of power, whether they be corporate interests, religious groups, or medical authorities. But what is almost left uninterrogated in these critiques are the ways that by performing labor within a scientific system, they are adopting the epistemology and power hierarchy of that system when they approach their own bodies.

This is even more significant when seen in the context of new technologies that are developed for women to use when navigating their role as manual servo-mechanism of their body. Several new computerized thermometers have recently entered the market.<sup>260</sup> One of the most evocatively advertised is the Lady-Comp, described by its advertising material as “the intelligent fertility computer.” The Lady-Comp is a

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<sup>260</sup> Cyclotest, DuoFertility, and Pearly are three competing computerized thermometers manufactured for fertility tracking. DuoFertility is a wearable sensor that continually records temperature data and reports it to a handheld reader. Cyclotest and Pearly work like the Lady-Comp, with a thermometer attached to a small computer. (As of this writing, Cyclotest also seems to have adopted Lady-Comp’s “wake up, measure, done” tag line.)

combined unit of digital thermometer and small hand held computer that performs the work of recording and analyzing a user's temperature entirely within the unit. Speaking directly to potential users, the Lady-Comp offers that "it puts you in control."<sup>261</sup> (See Figure 5.4)

However, the major advertising agenda for the Lady-Comp actually lauds the fact that the Lady-Comp enables women to abdicate control, because it allows them to delegate all of the interpretive work of natural family planning to the machine. (One of its tag lines is actually "Wake Up, Measure, Done.") In the practice of selling this abdication, the makers of Lady-Comp assume that a woman will also be reassured to have the machine interpret her temperature data for her — they are depending on the fact that machine knowledge must obviously be perceived as more trustworthy than the analyses that a woman might make on her own. As one brochure says, Lady-Comp "contains a database of more than 900,000 cycles and uses bio-mathematical forecasting calculations as well as the very latest computer techniques."<sup>262</sup> In its use of vague techno-scientific buzzwords that fail to mention any of its actual mechanisms or specific calculations, they are selling the Lady-Comp precisely on the virtue that it black boxes the processes of women's fertile bodies that other women have spent decades figuring out. It does this so bluntly, in fact, that it literally reduces its informational output to a red or green light. Red means that a user is fertile, and should abstain from intercourse.

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<sup>261</sup> Lady-comp.com Advertising Materials

<sup>262</sup> "Why Lady-Comp," Lady-Comp official website, Valley Electronics, <https://www.lady-comp.co.uk/en/medical-basics/why-lady-comp/>.

Green indicates that she is infertile, and that sexual intercourse can be had without barrier.<sup>263</sup>

Other computerized fertility systems also sell the expert knowledge of their designers and equipment in vague and patronizing terms. Ovuline, the company responsible for the Ovia app, repeatedly lauds the “Harvard scientists” that helped to create the product, and repeatedly makes claims that Ovuline can do things that women might not want, or be able, to do. When discussing its features, the explain that “Ovia is able to accurately predict ovulation and the fertile window, but that’s just math (super-sophisticated, genius-level math.)”<sup>264</sup>

Despite these tools, many women still engage in the interpretive process themselves, and they indicate that it gives them a sense of security to be able to know how the determination of fertility was made, to have the option of conferring with other women about their interpretations, and to even have the option of tinkering with their technology in order to make it “feel” more right for their own bodies. In one fertility forum thread, women discussed at length their strategies for working with software applications to determine their fertile period. Some women described using two separate applications, and interpreted their fertile period generously when the two programs disagreed. Other women described how they tried to make their electronic charts match up with the paper charts that they had been keeping by hand and interpreting using

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<sup>263</sup> Lady-Comp is not the only computerized thermometer to use a similar system; DuoFertility uses a similar “green light” system, although it gradates the color so that the most saturated green indicates a woman’s most fertile time, with less fertile days indicated by less saturated color.

<sup>264</sup> “How Ovia Works,” Ovuline.com, <http://www.ovuline.com/guide/16/how-ovuline-works>.

guidelines learned in books. Still others went farther, and described in detail the ways that they altered settings in the software's preferences in order to manipulate the program's estimation of their fertile period; once they could arrange the settings so that the software predicted their fertile period during the same days that they also felt that they were fertile during one cycle, then they believed that they could trust the software to function interpretively in the future. On this forum, it was rare to encounter a woman who took the readings of her chart as objective proof without some measure of negotiation between the chart and her own experience of her body.

As evidenced by the booming trade in software and smartphone apps for determining fertility, women do enjoy having the measure of negotiating ability that many other applications provide. For example, the iOS app Lily allows women not only to see, share, and interpret their temperature charts themselves, like charts from a generation ago it also allows women to specify in some (still standardized) level of detail their additional physical symptoms, like the quality of their cervical mucus or the position of their cervix.

In *Taking Charge of Your Fertility*, one of the most widely-cited and influential books on natural family planning at the turn of the twenty-first century, Toni Weschler describes that a woman's body is a "walking biological computer" from which, if adequately trained, she can read information.<sup>265</sup> "The truth is," Weschler reassured, "all

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<sup>265</sup> Toni Weschler, *Taking Charge of Your Fertility* (New York: Harper Collins, 2006), 52.

women of reproductive age can easily learn how to observe and chart...This information can then be used” by women to conceive — or prevent — a pregnancy.<sup>266</sup>

For many women this cybernetic vision is hopeful; having a body that is like a computer can feel powerful because it feels actionable. Instead of feeling as if her body is “incompetent” and “inadequate,” as many women are sometimes told by their doctors,<sup>267</sup> a woman who knows that her body is a computer can experiment and tinker with both her bodies’ software as well as with the technology that she uses to analyze it. She can train herself in the operation of her body, as Weschler describes,

When interpreting temperatures, it is important that you train your eyes to ‘see the forest through the trees.’ The key to doing so is to look for a pattern of lows and highs. In other words, you’ll find that your temperatures before ovulation will go up and down in a low range, and the temperatures after ovulation will go up and down in a high range. The trick is to see the whole, and not focus so much on the day-to-day changes.<sup>268</sup>

Just as S. Weir Mitchell advised physicians in 1891 that “the instrument trains the man,”<sup>269</sup> interpreting her temperature chart can train a woman to think like a computer capable of analyzing the entire data set, rather than becoming distracted by the day-to-day

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<sup>266</sup> Ibid.

<sup>267</sup> Weschler, *Taking Charge of Your Fertility*, 52. Martin, *Woman in the Body* also documents quite thoroughly the damaging effect that negative metaphors can have on the mental and physical well-being of the women that she interviewed.

<sup>268</sup> Weschler, *Taking Charge of Your Fertility*, 53.

<sup>269</sup> Mitchell, “The Early History of Instrumental Precision,” 8.

fluctuations of her physical state. For some women, this training becomes seamless, and reading their chart becomes fluid. Louise Lacey, a natural family planning practitioner and educator, said, "I read my charts like they were sheets of music. Better than any photograph, they represented the 'real' me."<sup>270</sup>

Joseph Dumit and Robbie Davis-Floyd describe the lure of technology for understanding, interpreting, and managing women's bodies in their introduction to a volume called *Cyborg Babies*: "In other words, (a sense of) control is better than surrender; and because it gives us (the illusion) of control, technology is better than nature."<sup>271</sup> Yet, as women become more intimately familiar with the technology to which they are comparing their bodies, and as they more fully internalize the metaphors of charting and information, some women have grown to see in it more expansive possibilities for meaning making. In 2012, Maria Farrell, a writer and internet policy consultant, wrote about her experience using in vitro fertilization. In a section titled "Embryos are not babies," she wrote,

Despite what we went through to create these embryos, I am left with the cold conviction that they were opening gambits, and no more. Certainly, I would have loved them if they'd turned into babies and mourned them if I'd lost them farther along, and I was very, very sad to not get pregnant. But I felt as if the embryos

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<sup>270</sup> Singer, *Garden of Fertility*, 33.

<sup>271</sup> Joseph Dumit and Robbie Davis-Floyd, eds, *Cyborg Babies; From Techno-Sex to Techno-Tots* (New York: Routledge, 1998), 11.

were simply sets of ultimately flawed operating instructions that de-compiled within hours or days.

Here the metaphor of de-compiling code is both evocative and does a bit of interpretive work for Farrell in making sense of the medical experience she underwent and the inner workings of her own body. Her body had produced from its own code an embryo that, ultimately, was faulty, and it decompiled back into mere DNA.<sup>272</sup> Except that an embryo, of course, is not software, and what it “decompiles” into is not disembodied code; a failed embryo is still flesh, actual tissues that is out of place, and a woman must still literally bleed it out of herself.<sup>273</sup>

### **Objectivity & Alienation**

Charis Thompson has argued against the common critique that objectification and alienation go hand in hand — that when certain kinds of technologies are wielded upon the body, the body becomes alien, taking with it the agency and authentic self-hood of the women who inhabits it. This critique has been an especially powerful argument when levied against reproductive technologies, which are seen as uniquely intimate, culturally and individually weighted, and technologically and bureaucratically rigorous. As she

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<sup>272</sup> Maria Farrell, “Things I have learnt from and about IVF,” *Crooked Timber* (February 18, 2012), <http://crookedtimber.org/2012/02/18/things-i-have-learnt-from-and-about-ivf/>, accessed February 24, 2012. Historian of science Lily Kay has examined the history of the informational metaphor for genetic code as it was created and wielded by scientists in multiple disciplines, although her study does not extend to the popular usage of the metaphor. Lily Kay, *Who Wrote the Book of Life?* (Stanford, CA: Stanford University Press, 200).

<sup>273</sup> Additional narratives of infertility and loss can be found in Margarete Sandelowski, *With Child in Mind: Studies of the Personal Encounter with Infertility* (Philadelphia: University of Pennsylvania Press, 1993).

puts it, “objectification of women is held responsible for the subjugating and disciplining effects of reproductive technologies on women's bodies and lives.”<sup>274</sup>

In her ethnographic study of women in infertility clinics, Thompson argues against this critique, claiming that sometimes women are active participants in their own objectification, which they do not resist but in fact desire. Patients in these clinics often feel as if they are courting physicians and other practitioners, competing to be, in one of her actor's words, the “the doctor's friend, the best patient” in order to best orchestrate this objectification.<sup>275</sup> In order to achieve their goals, patients are put in the position of actively managing a barrage of modes of objectification, each time molding themselves to fit the material, social, bureaucratic, and epistemic models that are required at each step.

This is the very same orientation that danah boyd illustrated above, and the one lauded by a movement in domestic health care called the quantified self movement.<sup>276</sup> boyd did not wish to be objectified as a woman, but she did actively participate in the project of objectifying herself as a human when she tracked her weight, her activity, and, eventually, her temperature.<sup>277</sup>

In Thompson's narrative about objectification and alienation, when success — a

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<sup>274</sup> Charis Cussins, “Ontological Choreography: Agency Through Objectification in Infertility Clinics,” *Social Studies of Science* 26, no. 3 (August 1996): 576.

<sup>275</sup> Ibid., 589.

<sup>276</sup> For more on this movement, see the Conclusion.

<sup>277</sup> boyd, np.



pregnancy — is achieved, every machination along the way becomes incorporated into a coherent, seamless trail; the various objectifications that the woman has performed become, in a way, retrospectively reintegrated. Alienation from self, then, is only the result when these methods fail, and the reproduction of self in the form of child has not occurred.<sup>278</sup>

But what are the implications of such a situation, if it means that a tool only feels problematic from the position of failure? Are not the same problems inherent in failure *still* inherent in success, only masked by the success of the medical exchanges? This is the peril of a technocratic solution to the problem of our female bodies, even if women are the supposed technocrats. Self-objectification may be a tool that women wield in order to achieve the end that they desire — when objectification is the precondition and result of modern medical care, how could she do otherwise? — but the alienation from the products of her labor (e.g. her own body) must necessarily still occur. (This is in part the alienation that enables a woman to see her embryo as code, while still having to physically experience its removal from her body.)

Susannah Cooper explained to her fellow fertility educators that it is “easy to trust numbers,” and she is certainly correct.<sup>279</sup> The work of fertility tracking provides women with knowledge and power that are in accordance with our predominant cultural way of knowing — one that privileges information management — and performing it bolsters

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<sup>278</sup> Ibid., 599–600.

<sup>279</sup> Cooper, Suzannah, “An OM/NFP Class Outline.”

their own credibility to speak for their bodies. Justin Trott, M.D., as President of the American College of Women's Health Physicians, wrote in the forward to a popular fertility awareness manual,

The fertility charts in [this book] shift authority over women's health from physicians, academics, and pharmaceutical companies to individuals who know their own bodies. These charts create a new model for research. Indeed, there is unlimited potential for fertility charts to inform us about women's health without expense or invasiveness. Doctors and research institutes, heads up! This is clinical research.”<sup>280</sup>

Notice that it is the *charts* that shifted authority to women in her view; the practice of creating disembodied information — the act of objectification and the proof of proper scientific work — is what has given women the ability to speak for themselves. Yet even given this purpose for the charts, they have been highly internalizable objects.

Gizmodo, a design and technology website run by the Gawker Media Network, published a story in the summer of 2014 of one woman's experience using Glow, the fertility application developed by a former Pay-Pal founder discussed in Chapter Two. The story, written by Alissa Walker, was conversational and playful, in the house style, and an overwhelmingly positive portrait of the app; it was titled “How an App Helped Me (and 20,000 Other Women) Get Pregnant,” referring to Glow's claim that approximately

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<sup>280</sup> Singer, *The Garden of Fertility: A Guide to Charting Your Fertility Signals to Prevent or Achieve Pregnancy - Naturally - and to Gauge Your Reproductive Health*, xvi.

a year after its release it has helped more than 20,000 women become pregnant.<sup>281</sup> The author described her experience using the app as game-like, which was central to its appeal for her: “The app gave me a series of tasks to do each day that made me feel connected to the process: I filled out my basic information, but the app also asked me how I felt emotionally and provided me with health tips...In a way, Glow felt like a game where I was taking incremental steps, every day, towards my goal”<sup>282</sup>

This not a component of the application that is lost on its designers. Walker spoke with Jennifer Tye, the company’s head of marketing and partnerships. Tye validated Walker’s use of the app. Walker quoted Tye, “I think there is that aspect, a feeling of accomplishment or like you have some control...You can see what you can change or alter about your behavior.”<sup>283</sup>

Walker's narrative ended happily, with pregnancy achieved, just before she would have begun the process of intrauterine insemination. She wrote, “I was pregnant. Without the medical intervention that everyone had claimed I needed. We had done it ourselves. Naturally.”<sup>284</sup> Walker paints her “fundamentally changed” relationship with her health as natural, despite it being, in the language of of Silicon Valley, a gamified and algorithmically-mediated one. But her story had a happy ending, because she won the

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<sup>281</sup> “Introducing Glow Nurture,” Glow.com, <http://blog.glowing.com/post/92048553555/introducing-glow-nurture> (July 17, 2014). One of Glow’s competitors, Ovuline, phrases their numbers differently, claiming “250K women helped” without citing the exact nature of that help. Ovuline.com.

<sup>282</sup> Alissa Walker, “How an App Helped Me (and 20,000 Other Women) Get Pregnant,” Gizmodo (August 28, 2014), <http://gizmodo.com/how-an-app-helped-me-and-20-000-other-women-get-pregn-1624674712>.

<sup>283</sup> Ibid., np.

<sup>284</sup> Ibid., np.

game.

The cultural and epistemological power that draws women toward fertility tracking can be powerful to the point of intoxication; women like Smita, forty-two, have reported feeling ever increasingly “obsessed” with their temperature curves and the slightest changes in their cycles.<sup>285</sup> Practicing fertility trackers may no longer see their bodies as unknowable and unpredictable “slimy green monster[s]” that threaten them with pregnancy at every turn,<sup>286</sup> but they do still worry ceaselessly about their responsibility to manage them. The closer and more technologically precise they come in their knowledge of their bodies, the greater is the expectation that they should be able to control them. The nature of the problem has changed. Less and less often are women's bodies perceived as unknowable and uncontrollable; instead, when a failure results from natural family planning, women are regarded as unreliable workers.

This feeling engenders an attitude that Leah Morton, M.D. described:

It's an immense responsibility to have a body—and then to use Fertility Awareness... Fertility Awareness is a science. It's not an improvisation... It requires you to bow down to nature. If you don't observe your signals and follow the rules every day, nature will correct your sloppiness: if you don't pay attention nature will prevail.<sup>287</sup>

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<sup>285</sup> Ibid., 156. When publishing the results of her own interviews, Katie Singer used pseudonyms when quoting directly from lay women. I have preserved these pseudonyms.

<sup>286</sup> Aguilar, *The New No-Pill No-Risk Birth Control*, 3.

<sup>287</sup> Singer, *The Garden of Fertility: A Guide to Charting Your Fertility Signals to Prevent or Achieve Pregnancy - Naturally - and to Gauge Your Reproductive Health*, 131.

Here again is the elision of women's bodies, nature, agency, and the technocratic rules which bind them all. With the objectification of scientific practice, and the exalting of constant vigilance, fertility trackers have continued to integrate their selves with their bodies and their tools, but in such a way that women are still in opposition with their bodies. Blame has been placed squarely on their shoulders, and their bodies will exact punishment for poor management. As one young woman who experienced an unintended pregnancy put it, despite the fact that she and her partner were in some sense both responsible for the conception, “I remember that when we first got the report I was left with the feeling that *I* had failed at something that was *my* job.”<sup>288</sup>

What the gamification of fertility makes excruciatingly clear is that, if some women can be empowered to win, then other women are likely to lose. Linda Carbone wrote in her memoir of infertility, *A Little Pregnant*, about her many years of attempting to get pregnant and carry a pregnancy to term. She described intimately the labor of her attempts, both for herself and for the medical system in which she underwent numerous invasive interventions, “trying to be a good patient” and “dutifully” accepting recommendations for ever more involved procedures.<sup>289</sup> She internalized the lessons of a centuries’ worth of medical practice, technological introduction into the home, and rhetoric surrounding patient empowerment, responsibility, and blame:

Infertility is what I do. It’s my vocation: I don’t get pregnant, or I don’t stay

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<sup>288</sup> Aguilar, *No-pill, No-risk Birth Control*, 68.

<sup>289</sup> Linda Carbone and Ed Decker, *A Little Pregnant: Our Memoir of Fertility, Infertility, and a Marriage* (New York: Atlantic Monthly Press, 1999).

pregnant. I'm good at it. I've been more successful at it than at anything else I've tried as an adult. My infertility is layered, soft thing, spun of gossamer and tears. It will disintegrate if I touch it. So I give it substance in other ways.

I have a record of every date on which I menstruated and ovulated during the last seven years. Also every date my husband and I had intercourse. I could draw charts and graphs — “Here's where I didn't get pregnant *that* month” — to illustrate our childlessness. The ritual and science of failure...<sup>290</sup>

Even worse, it threatened to turn me wholly inward, shrinking my perspective down to the size of my uterus...I was mesmerized by the process...Now, sweating and disoriented, from the frown of troubled sleep still upon me and the blood still roiling in my ears, I search frantically for some familiar sign of who I was back before the fever took hold.<sup>291</sup>

This story encapsulates why it is crucial to introduce the idea of patient labor into our cultural and medical discourse. Carbone's memoir of her experience, as so many infertility memoirs are, is so painful in part because of the blame that she lays at her own feet for “her” failure to become and stay pregnant. But, as any doctor will

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<sup>290</sup> Carbone and Decker, *A Little Pregnant*, 3.

<sup>291</sup> Carbone and Decker, *A Little Pregnant*, 6-7.

disingenuously remind a patient in the same breath that they hand her a list of foods to eat, or as any fertility app will caution as it simultaneously sends push notification reminders to exercise and meditate, sometimes cybernetic feedback loops just break. Some women will be unable to get pregnant, and there is no responsibility or blame that can be laid at their feet.

When patients labor, they do so in the particular ways that have been outlined in this dissertation — they use diagnostic instruments, they chart their symptoms, they quantify their bodies — because those are the ways that are most useful for the medical system, not because those are the ways that are inherently best for patients. They certainly don't do so because those are the ways that are most truthful. The rhetoric of empowerment that surrounds the work that patients do masks the fact of their labor, hiding its connection to a system of hierarchy and and bureaucracy behind the promise of Doing it For Yourself, Naturally. But for every story of a “successful” Glow baby, there is available a story of a women whose body could not be disciplined, a woman who could not wrangle her unruly flesh.

## **Conclusion**

### **“Welcome to the Future” ...by which we mean the past**

There is a smartphone app, first released in 2009 but continually updated since, called Total Baby. It touts itself as “the most Complete Baby Logging and Tracking Application available.” Its feature set is predictable for this type of application: parents or other caregivers can keep track of a child’s developmental milestones, their height and weight, their sleeping and bath time schedules, their diaper changes, their nursing and eating habits, and more, including any number of “create your own” tracking items.<sup>292</sup> In press copy that circulated widely during Total Baby 1.0’s initial release, the company touted their “innovative new features” with the tag line, “Welcome to the future of Baby Logging.”

In the buzz and storm around Big Data, the Quantified Self, so-called “wellness tracking,” and the smartphone app future, the most striking fact is that, while this might certainly seem like the world that we are in, we don’t need any particular welcome to it. It is not, in truth, all that new. We have been here, or at least on our way, for more than a century.

### **“Quantified Self: Self Knowledge Through Numbers”**

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<sup>292</sup> “Total Baby Features,” Andesigned, <http://www.andesigned.net/totalbaby.htm>.



The “quantified self” movement encourages individuals to quantify, record, and analyze almost every aspect of their health and behavior, and as a movement it was born out of the application of computing technologies to the problem of knowing the self. It depends upon something of an ethos of personalized big data — the more data points that there are to analyze, the more reliable are the inferences that can be made — which encourages an ethic of perpetual self-surveillance.

The movement was founded by Gary Wolf and Kevin Kelly, both former editors at *Wired* magazine. The primary principle of the quantified self movement is that by collecting, visualizing, and analyzing data surrounding any number of physiological or emotional phenomena (e.g. heart rate, number of steps walked in a day, number of bites eaten, quality of mood, number of hours slept, etc.) an individual can figure out the best way to optimize that behavior, becoming the healthiest or the happiest that they can be. Practitioners often discuss the way that data — literally, individual bits of discrete numerical information — can, when collected into an aggregate statistical picture, reveal the “wholeness” of our selves, a wholeness that we wouldn’t otherwise have access to.

In a post on QuantifiedSelf.com, blogger Ernesto Ramirez wrote,

Data. Health. Communication...Taken together, their influence on our wellbeing, to borrow a phrase from my friend Karen Herzog, “our wholeness,” is exponentially influential. So why do they seem to rarely coalesce during our conversations, discussions, and interactions with the individuals and institutions

tasked with tracking, diagnosing, and treating the cracks and fissures in our wholeness?<sup>293</sup>

Self-tracking is not only about self-knowledge but also about communicating with medical authorities. Ramirez interviewed Katie McCurdy, who lives with an autoimmune disease that affects her muscular strength. McCurdy described her process of creating visualizations of her bodily symptoms, which she has used specifically to communicate effectively with her doctor. McCurdy explained, “For me it’s about creating a representation of my history and my health that can be communicated most efficiently....I see it as...changing the dynamics of the relationship so that the patient is more of a partner in care.” She suggests that all patients should have the option of doing as she has done: “I think that giving patients tools to create simple, clean, and attractive visualizations could help make the experience better for doctors...Imagine if the doctor could work with the patient and suggest a type of graph or visualization that would be most helpful.”<sup>294</sup>

McCurdy does not actually need to imagine that this could be so — her process and argumentation here is resonant with Édouard Séguin’s approach to temperature charting, which he encouraged physicians to teach to their patients. In both cases, a system of charting and information presentation was tailored specifically for physicians,

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<sup>293</sup> Ernesto Ramirez, “Talking Data With Your Doc: The Patient,” QuantifiedSelf.com (March 29, 2012), <http://quantifiedself.com/?s=wholeness&x=-974&y=-40>

<sup>294</sup> Ramirez, “Talking Data With Your Doc.” Yet even after describing the amount of work she puts in to communicating effectively with her doctor, she also recommends that “self-tracking and visualization can help increase patient compliance! My low-carb diet was actually prescribed by my doctor. When I saw on the timeline that my diet changes were strongly correlated with my gastro symptoms improving, it was very reinforcing of my diet behavior.”

making it possible for a patient or a caregiver to be a reliable reporter of medical information within the context of a visit with a medical professional.

Many scholars have argued that this approach to the quantified self is the embodiment of neoliberalism.<sup>295</sup> In fact, the economization of the quantified self began a century ago with the thermometer's introduction into the home and the conscription of women as the unpaid medical laborers wielding it. Rather than view the economization of the quantified self as an expression of neoliberalism, what if we recognize that neoliberal governmentality — in which self-surveilling market mechanisms order the population — has roots in the medical and health care practices which directly preceded the quantified self movement? Neoliberalism has subjective and practical precursors in nineteenth- and twentieth-century medicine; these foundations simply haven't been recognized because they were laid using women's bodies. What's more, this lack of recognition has not been simply unintentional, an accidental overlooking of women's role in history. The erasure of women's history from the history of the modern quantified self has been active and intentional by many of the movement's founders and participants.

When Max Levchin described his fertility app, Glow, as “progressive” and “bad ass,” he did so to place it in explicit opposition to the fertility apps that already existed on

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<sup>295</sup> Deborah Lupton, “The quantified self movement: some sociological perspectives,” *This Sociological Life* (November 4, 2012), <http://simplysociology.wordpress.com/2012/11/04/the-quantitative-self-movement-some-sociological-perspectives/>. See also Deborah Lupton, “Quantified Sex: a Critical Analysis of Sexual and Reproductive Self-Tracking Using Apps,” *Culture, Health, and Sexuality* (June 11, 2014), [Epub ahead of print], in which Lupton demonstrates the way self-tracking apps enable both participatory surveillance and a valorisation of normative gender roles. Whitney Erin Boesel, “Empowerment Through Numbers? Biomedicalization 2.0 and the Quantified Self,” *Cyborgology* (September 6, 2012), <http://thesocietypages.org/cyborgology/2012/09/06/empowerment-through-numbers-biomedicalization-2-0-and-the-quantified-self/>.

the market and to the fertility knowledge sharing systems that women had established during the previous decades. He emphasized in an interview with Katie Boehret in 2013 that Glow was “clinical,” based on math and data science, and was part of a trend that would be the future of medicine. He said that with the exception of the name “Glow” (which refers to a popular description of pregnancy’s effect on a woman’s appearance), the app did not deal in euphemisms, but rather straightforward science.<sup>296</sup>

During a demonstration, a moderator asked Levchin how Glow is different from similar apps, a question Levchin side-stepped. Later on in the same presentation, Levchin mocked the practice of examining cervical mucus manually, which he said reveals how “ridiculously nineteenth, or like fifteenth, century this whole industry is.” Yet, as he continued to run the demo, Glow’s input screens revealed a feature for inputting the quality of a user’s cervical mucus that used the exact terminology that he just disparaged, including words like “slippery,” “sticky,” and “wet.”<sup>297</sup>

Alissa Walker, a Glow user, voiced a somewhat similar sentiment when describing what she liked about Glow that set it apart from the previous fertility apps that she had tried.

First, [Glow] was good-looking: It was almost like it was designed to match the new look of iOS 7. It also talked to me like an adult. Instead of cheesy

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<sup>296</sup> “KatieCam; Talking Fertility with Glow Creator Max Levchin,” AllThingsD.com (May 29, 2013), <http://allthingsd.com/20130529/katiecam-kids-around-talking-fertility-with-glow-creator-max-levchin/>.

<sup>297</sup> Admittedly, he reported that Glow was looking for ways to further instrumentalize cervical mucus detection; no one should tell him that a number of technologies — including various types of microscopic lenses — were proposed during the 1970s. “Max Levchin at D11: Glow Fertility App,” *Wall Street Journal* Video (May 29, 2013), <http://live.wsj.com/video/max-levchin-at-d11-glow-fertility-app/70D9CC84-FD44-45B8-BBF4-82D195BA6985.html#!70D9CC84-FD44-45B8-BBF4-82D195BA6985>.

euphemisms and abbreviations for periods and intercourse, the information was presented in normal, grown-up language. But here was the real clincher for me:

The app was blue and purple, not pink.

Here Walker aligned herself with a certain kind of aesthetic and technological sensibility that read as modern, but more importantly she also positioned herself in opposition to anything that might be coded as feminine, cutesy, or folksy. This is a common refrain. For danah boyd, who tracked a multitude of bodily symptoms but experienced an initial aversion to fertility tracking, its association with a particular kind of cultural femininity was part of what kept her distant from it.

Since I began keeping up to date on the fertility app landscape in 2012, there has been a noticeable shift in the aesthetics of fertility tracking applications. Some websites, like FertilityFriend and Toni Weschler's companion website for *Taking Charge of Your Fertility*, continue to have a consistent and relatively low-tech aesthetic, with a large number of "cutesy" or otherwise coded-feminine touches like hearts, flowers, eggs-in-nests icons, and pink and purple color schemes. Other apps like Groove, Kindara, Ovuline, and Lily have redesigned their interfaces. Between version 1.0 and 2.0, the app Lily, for example, has largely eliminated its use of large, stylized pink swirls in its app and documentation, and it has increased the number of features it offers for data export and management.<sup>298</sup>

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<sup>298</sup> For example, as of version 2.0, users are able to export their information from any cycle as a PDF. The website for Lilly encourages women to export their charts because "sometimes it's really handy... We bet your physician will love them!" "Lily Pro - Features," Whimsicallily.com, <http://whimsicallily.com/lilypro/en/features.php>.

What's more, some of these apps also partner with the manufacturers of other quantified self devices. Ovuline's website, for instance, features an online store where users can also purchase Fitbits, blood pressure and heartbeat monitors, and scales that will sync with Ovuline's accounts. Glow has also partnered with MyFitnessPal to integrate user data and diet and exercise tips into their feature set.

There is a pervasive sense that fertility is, as boyd described, an "othered category" — even when quantified selfers are familiar with the basics of natural family planning, it can seem a world apart from their own practices. Even boyd, who began to explicitly track the physiological markers of her fertility, still distanced herself from "fertility" as a concept that might have implications for her identity. Concluding her blog post, she wrote, "Ladies, if you're curious about your body, try measuring your temperature and looking for patterns in your hormones. It'll be hard to read up on all of this totally divorced from the fertility conversation, but so many other patterns in our bodies are connected to these patterns." In her conceptualization, temperature tracking was hormone tracking, not fertility tracking, and she deliberately ignored what it might have to say about this other component of her biological life.<sup>299</sup> Even when using the same tools, the same software, and the same scientific research, she distanced herself from "women concerned with fertility" as a social group.

In these ways, both users and technology manufacturers interested in the quantified self have distanced themselves from the methods, technologies, and systems of

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<sup>299</sup> boyd, "omg girls' bodies are fascinating," np.

knowledge upon which their own practices are built. Maintaining this historical discontinuity has political ramifications. First, it exceptionalizes fertility, placing it apart from larger discussions of health and wellness, keeping it a separate sphere only of concern to women — or, as boyd shows, only of concern to *some* women.

Second, this discontinuity can also have the effect of preventing us from thinking critically about the potential impacts of the quantified self movement. As boyd also referred to in her post, we have an extensive critical discourse that deals with the objectification of women's bodies (she refers to her disdain of dieting techniques and the obsession with women's body image), but by excluding the feminine, and the feminist, from the quantified, we are at risk of cutting ourselves off from a productive critique of the methodology of the quantified self. What does it mean for a tracker to turn their body, and their mood, and their diet — their “whole” self — into a graph? What does it mean to make yourself into a quantified work object? And what does it mean for both women and men to exclude this particular, culturally loaded, physiologically complicated, and socially and politically important component of themselves — their fertile potential — out of that identity?

Third, this erasure has contributed to making the modern, empowered, data-wrangling patient seem new, special, and full of liberatory potential, rather than the site of the expansion of mother's unpaid medical work onto the backs of all. Women's uncompensated thermometry is the model upon which we are all now being asked to do

uncompensated medical labor that enables not only doctors but also research scientists, app developers, and health insurance companies to profit.

### **Cyborg Epistemology**

I am reminded again of Haraway's cyborg manifesto, her desire for a world in a "non-naturalist" mode, "a world without gender" which would consequently be a world without birth or origin. For Haraway, the cyborg privileges the knowing, ironic self that imagines itself to be free of its origins because of the thoroughness of its embodied knowledge. Instead of a language of rebirth of the self, which connotes both biological sex and chance for a parental influence, Haraway's cyborgs cope with the world and its violence through a "monstrous" regeneration. Such a world without birth would also, then, be "a world without end."

Despite the cyborg's emphasis on communication and network building, an individual subjectivity is still central to its ontology. Without even the idol of a potential future child upon which to focus attention, the modus operandi of the cyborg appears to be the further independent development of its own embodied selfhood. A cyborg, to the extent that it cleaves to cybernetic discourse, is totalizing in its emphasis on stability. The cyborg creates a new holism out of the wreckage of the built environment. But its goal, ultimately, must be that of the system from which it has so ceremoniously sprung: the continuance of self.



This is why the epistemology of the cyborg is, in fact, a lie and a manipulation. It posits that the only way to know the self is as part of a system of technology and organism, relying on embodied knowledge to make radical new choices. Yet the cyborg and its body are literally weighted with the expectations and desires of whomever made its parts. Its embodiment will never be its own. Because of this, it can never know itself as anything other than a child: with different desires from its parents, perhaps, but still in their image.

Haraway attempts to dismiss this dilemma, recognizing that “the main trouble with cyborgs, of course, is that they are the illegitimate offspring of militarism and patriarchal capitalism, not to mention state socialism. But illegitimate offspring are often exceedingly unfaithful to their origins. Their fathers, after all, are inessential.”

Yet her own concern with the future—with the continued subjective experience of the cyborg and the world it inhabits—belies this premise. Cyborg epistemology has incorporated into its *raison d’être* Lee Edelman’s idea of reproductive futurity, the idea that our entire politics “works to affirm a structure [and] to authenticate social order” that is purportedly for the “future” as depicted in the form of an idealized child.<sup>300</sup> Cyborg fathers are not inessential to this project, nor are they invisible; they are merely distributed. The cyborg father is Glow, sending a woman a push notification to meditate. The father is Séguin, training a woman to trust an instrument and not her hand. The father is a mother, or a potential mother, blaming herself for misreading a chart. A cyborg

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<sup>300</sup> Lee Edelman, *No Future: Queer Theory and the Death Drive* (Durham, NC: Duke University Press, 2004), 5.

can choose which thermometers and which apps to use, but they would be hard pressed to find another way to know their body, let alone another way to be in the world, one that doesn't revolve around the mechanisms and values of quantified stability.

### **Zombie epistemology**

Like many scholars at the turn of the twenty-first century,<sup>301</sup> I have occasionally turned to zombies in an attempt understand the world and to find another way to be in it. In thinking of cyborgs and the thermometric necrometer with which I opened this dissertation, it seems that it might be productive to wonder how a dead person — in contrast to a cyborg — might know the world. Could they ever know themselves? A proposed zombie epistemology might allow us to abdicate ourselves of some of the neoliberal responsibility thrust upon us, freeing us from the intense cultivation of our cyborg selves.

Zombies, in their relatively short history as monsters, have been inextricably linked to systems of imperialism, global capitalism, science, and technology. From Haitian legends of zombies raised from the dead to work in sugar mills,<sup>302</sup> to zombies

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<sup>301</sup> See, for only a few examples of the extant zombie scholarship in economics, politics, biology, etc, Sarah Juliet Lauro and Karen Embry, "A Zombie Manifesto: The Nonhuman Condition in the Era of Advanced Capitalism," *boundary 2* 35.1 (2008): 85-108; Deborah Christie and Sarah Juliet Lauro (eds.), *Better Off Dead: The Evolution of the Zombie as Post-Human* New York, NY: Fordham University Press, 2011; Jen Webb and Sam Byrnam, "Some Kind of Virus: The Zombie as Body and as Trope," *Body & Society* 14 (2008);

<sup>302</sup> *White Zombie*, directed by Victor Halperin and Edward Halperin (United Artists, 1932), DVD; William Seabrook, *The Magic Island* (New York: Harcourt, Brace, and Company, 1929).

created by rogue radiation brought back from space exploration<sup>303</sup> or by a pandemic virus instigated by irresponsible research,<sup>304</sup> zombies have stood in for the unknown, unacknowledged victims of high-modernist technoscience.<sup>305</sup> Gilles Deleuze and Felix Guattari have called zombies “the only modern myth,” referring to our twentieth-century facility with rationalizing death and destruction at the population level. We understand certain individual deaths (even many individual deaths) as simply the price of civilization in a technocratic era.<sup>306</sup>

So long as we are building ourselves out of the literal wreckage of war, and knowing our bodies and ourselves using the same instruments of science that have made us experiments and uncompensated laborers, we will only ever know ourselves as our creators knew us. Though as cyborgs we might appropriate knowledge from scientific journals, in applying it we accept for ourselves the risks that were only conceived of as applying to an abstract population. Though we might free the speculum from the hands of a professional gynecologist, in wielding it we internalize the rightness of his vantage point, knowing ourselves as he might see us instead of how we might feel us. Though we

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<sup>303</sup> *Night of the Living Dead*, directed by George A. Romero (Image Ten, Laurel Group, and Market Square Productions, 1968), DVD.

<sup>304</sup> *28 Days Later*, directed by Danny Boyle (DNA Films and British Film Council, 2003), DVD.

<sup>305</sup> Here I am referring to James Scott’s definition of high modernism, “a strong, one might even say muscle-bound, version of the self-confidence about scientific and technical progress, ... the mastery of nature (including human nature), and, above all, the rational design of social order commensurate with the scientific understanding of natural laws.” James Scott, *Seeing Like a State: How Certain Schemes to Improve the Human Condition Have Failed* (New Haven, CT: Yale University Press, 1999). For more on the history of zombies as a trope in literature, see Chera Kee, “They are not men... they are dead bodies”: From Cannibal to Zombie and Back Again,” in Christie and Lauro, eds., *Better Off Dead*.

<sup>306</sup> Gilles Deleuze and Felix Guattari, *Anti-Oedipus: Capitalism and Schizophrenia* (Minneapolis, MN: University of Minnesota Press, 1983), 355.

might try to make the best possible choices about what to eat, where to live, when to work, and how to take care of ourselves, cyborg choices will always be informed by the science and technologies that were made by people more powerful than us considering the interests of the whole system. The interests of all of the individual cyborgs were never part of the plan, and this makes system-knowledge at least a little bit dangerous to us.

Zombies, conversely, cannot deny their place in the horde. They don't have subjectivity. They don't optimize. They don't bricolage. They are the sacrifice to the high modernist system, and thus they can understand the lie: the system does not serve the lives of its members.<sup>307</sup> When we punish our bodies to lose weight, optimize our cholesterol, or maximize our fertility, it is because placing ourselves on our physician's bell curve is the only way a cyborg knows how to be good.

To embrace a zombie epistemology is to recognize our limitations as subjects of power, but also to accept the radical implications of not seeing ourselves as high modernism sees us. It is to recognize that we are powerful, but still victims. The dictate of the cyborg, internalized from its distributed patriarchy, is to self-actualize, to actively build and rebuild oneself using the tools and knowledge left behind. The dictate of the zombie, in contrast, is simply to be: to be radically embodied, to be present only in the present, to let go of the possibility of discovering, categorizing, organizing, and optimizing a self. As Lee Edelman puts it in his argument against reproductive futurity,

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<sup>307</sup> For a thorough critique of the medical system and an accounting of its effects on patients, see Ivan Illich, *Medical Nemesis* (New York: Pantheon, 1982).

“the queerness of which I speak would deliberately sever us from ourselves, from the assurance, that is, of knowing ourselves.”<sup>308</sup>

## **“Power”**

The first chapter of my dissertation has the title “A Truth Truer than a Poem.” This comes from Mary Putnam Jacobi’s essay in which she discusses her temperature research and women’s capabilities during menstruation more broadly. Given the controversial nature of her subject and her own position within the medical community, she submitted the essay anonymously, with only a Latin phrase as signature: *Veritas poemate verior*, “a truth truer than a poem.” It was Jacobi’s belief that her kind of argument, based on a statistical analysis of information gathered using scientific instruments, was more convincing than any truth that was based on romantic notions about women’s frailty. She thought that scientifically collected and observed data about the body was more truthful than the prevailing poetic vision of femininity. For Jacobi, and the generations of women who followed, physiological data was to become as truthful an expression of their bodies as their lived experience within it. After decades of work, the two came to be at times indistinguishable.

A century after Jacobi submitted her essay, feminist writer and poet Adrienne Rich wrote a poem that is the epigraph to my dissertation. Rich passed away in March of 2012, just as I was beginning to write, and I felt her loss particularly because she had

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<sup>308</sup> Edelman, *No Future*, 5.

been so omnipresent in my research. Her memoir, *Of Woman Born*, has been a canonical feminist text about the experiences and constraints of motherhood since it was published in 1976, and it has come up again and again in both my primary and secondary sources. In the midst of her memorials I rediscovered her poem, “Power.” I have returned to reread this poem more times than I can count during the process of writing. I have reread it every time I lose my way in my research and, crucially, every time that I lose sight of what I am writing for. The poem begins with history — history that is deep in the muck of the earth, in the deposits and sheddings of the material world that our bodies have left behind. Buried in this muck is a tonic, a “cure for fever,” a cure “for living on this earth” in the midst of all of the struggles that we face.

Halfway through the poem, Rich takes an abrupt turn toward Marie Curie, one of many female scientists that are not mentioned in this dissertation but who, I think, share a kinship in practice and desire with many of the women who are here. “She died,” writes Rich, “a famous woman, denying / her wounds.” She died “denying / her wounds came from the same source as her power.”

I have struggled, deeply, with the implications of my research. I have struggled with what felt like a profound bleakness, an impossibility of finding a way out of the seeming trap of medicine’s labor model, of ever finding a way to know oneself and to be in the world that does not result in more misplaced guilt, exploitation, and broken bodies. There seemed no way to be both part of the world — which means, unavoidably, being part of the economic reality of life and labor in the twenty-first century — without also

being subjectively crushed by it. Every incorporation of the technological and the natural — every time a thermometer was seen as an extension of a woman’s biology, every time a woman and her temperature chart were likened to a garden in the rain — seemed, not liberatory, but confining, making it more and more impossible to envision an alternative way of knowing and being — of having children and raising them — that wasn’t in some way based on being the best kind of worker for a doctor.

When patients labor, they do so in the particular ways that I outline in the dissertation — they use diagnostic instruments, they chart their symptoms, they quantify their bodies, they talk to their doctors in a specific language — because those are the ways that are most useful for the medical system, not because those are the ways that are inherently best for patients. The rhetoric of empowerment that surrounds patients masks the fact of their labor, hiding its connection to a system of hierarchy and and bureaucracy behind the promise of Doing it For Yourself, Naturally. But for every story of a “successful” Glow baby, there is a story of a women whose body could not be disciplined, a woman who could not wrangle her unruly flesh. A woman who has internalized the responsibility to control her body in the way that is most useful for her doctor, and considers it a personal failing — and not a systemic one — when she can’t.

Adrienne Rich wrote that she believed the “feminist vision [would] come to view our physicality as a resource, rather than a destiny.” But as women have treated our physicality as a resource, so too have others, who have used our bodies to build research labs, fertility clinics, an academic publishing empire, and smartphone app startups. And

if we can't avoid it, maybe we can practice radical acceptance, knowing that our labor, our data, and our literal bodies are distributed in hospitals and computers and tissue banks. At the very least, we should know why we do what we do, what bits of ourselves we are making and leaving behind, and where.

There are fundamental biological stakes here. Children get sick. Women get pregnant when they don't want to, and can't when they do. And I don't begrudge anyone who tries to take control of their body to have the life they want. But I also wonder what possibilities for changing our lives exist outside of the sphere of patient labor, that get hidden when the labor gets hidden. How might women's desire to be pregnant change if social expectations of motherhood were less constraining? If adoption worked differently and had different social resonances? If ideas about kinship and community were more open? How might women experience contraception differently if they weren't forced to be solely responsible for it? Or if heterosexual intercourse wasn't the preeminent — and for some, only — form of sex that was socially legitimate or desirable?

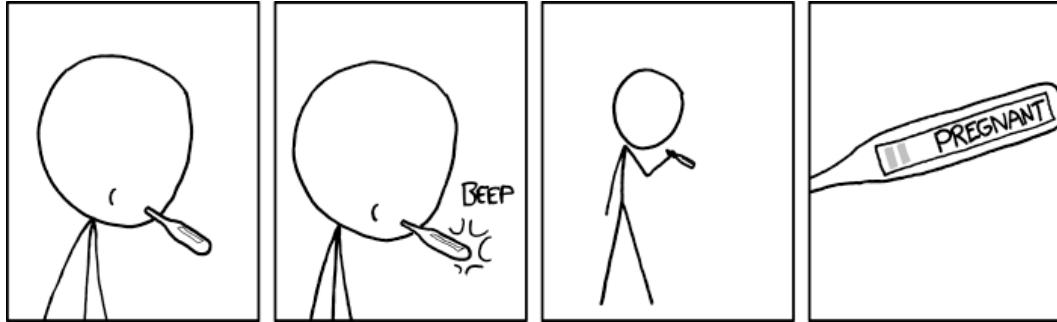
We should know what historical interests have aligned to make our particular path the one that is available to us and the one that seems like it must be right. Let us do what we need to do to survive in the world as it is, but let us not take responsibility for what isn't ours, or take into ourselves values and judgements that were never meant to serve us. Perhaps we can try to accept our bodies for what they are, and embrace an epistemological fracture. Perhaps we can somehow know our bodies multiply — instrumentally for Medicine and viscerally for Ourselves — and make peace with that



fact by knowing that it is a compromise, knowing that we are subjectively broken.

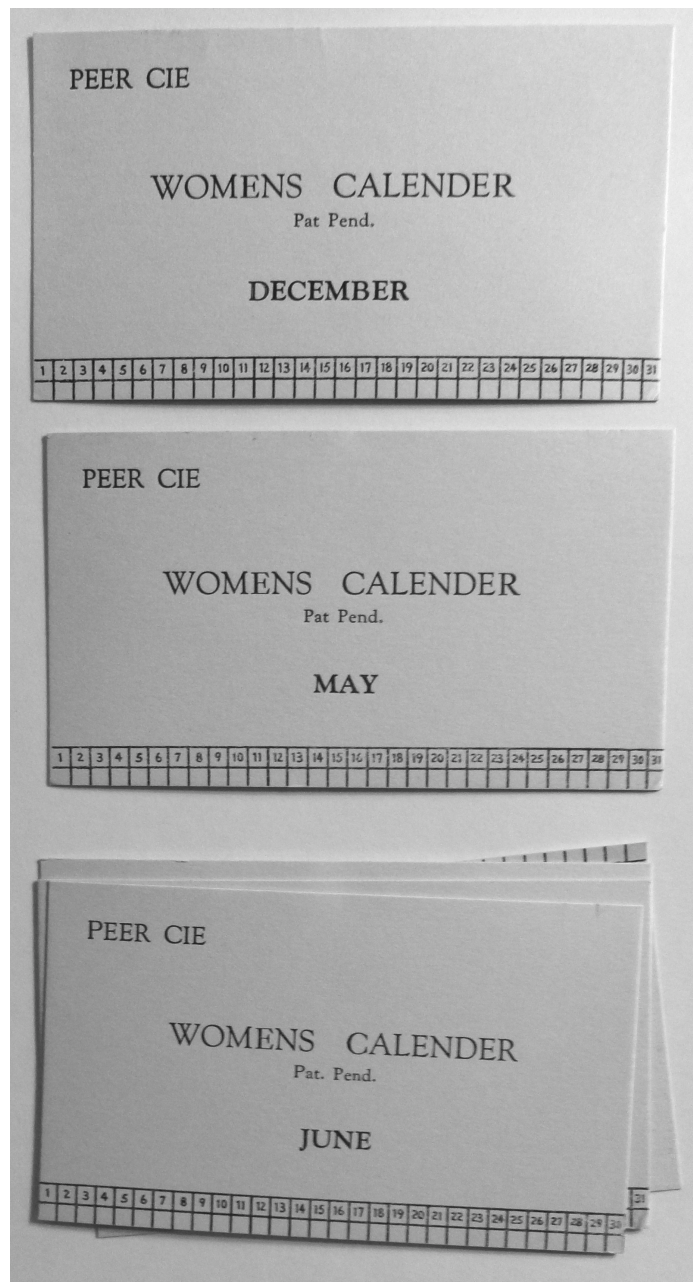
Maybe we can look outward to a community, instead of inward toward our charts, for knowledge, and kinship, and change.

**Figure 0.1**



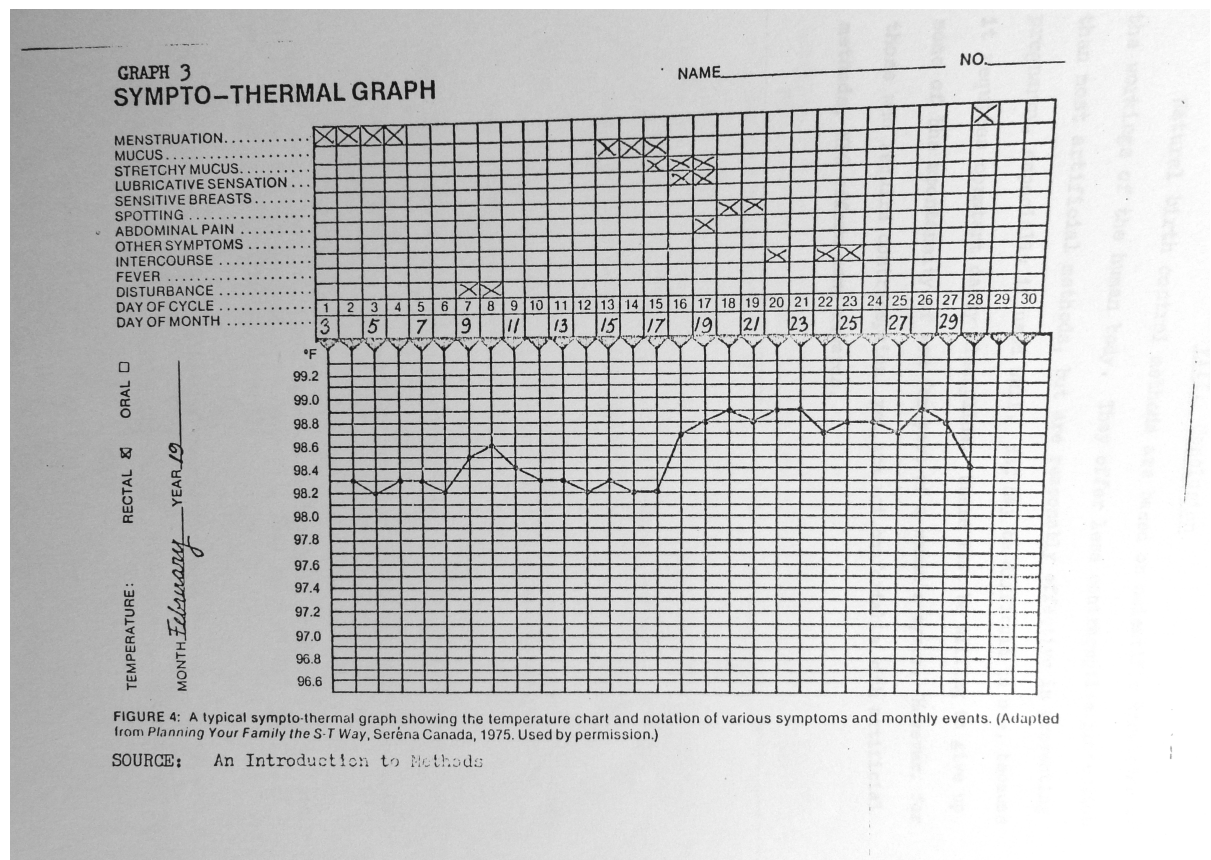
“Temperature,” xkcd, <http://xkcd.com/901>.

**Figure 1.1**



Blank calendars of the kind sent by patents to Hannah Stone at the Birth Control Clinical Research Bureau. Abraham Stone Papers, 1916-1959. H MS c157, Harvard Medical Library, Francis A. Countway Library of Medicine, Boston, Mass.

Figure 1.2



Sample Sympto-Thermal Graph for Instruction. Boston Women's Health Book Collective Records, Schlesinger Library, Radcliffe Institute, Harvard University.

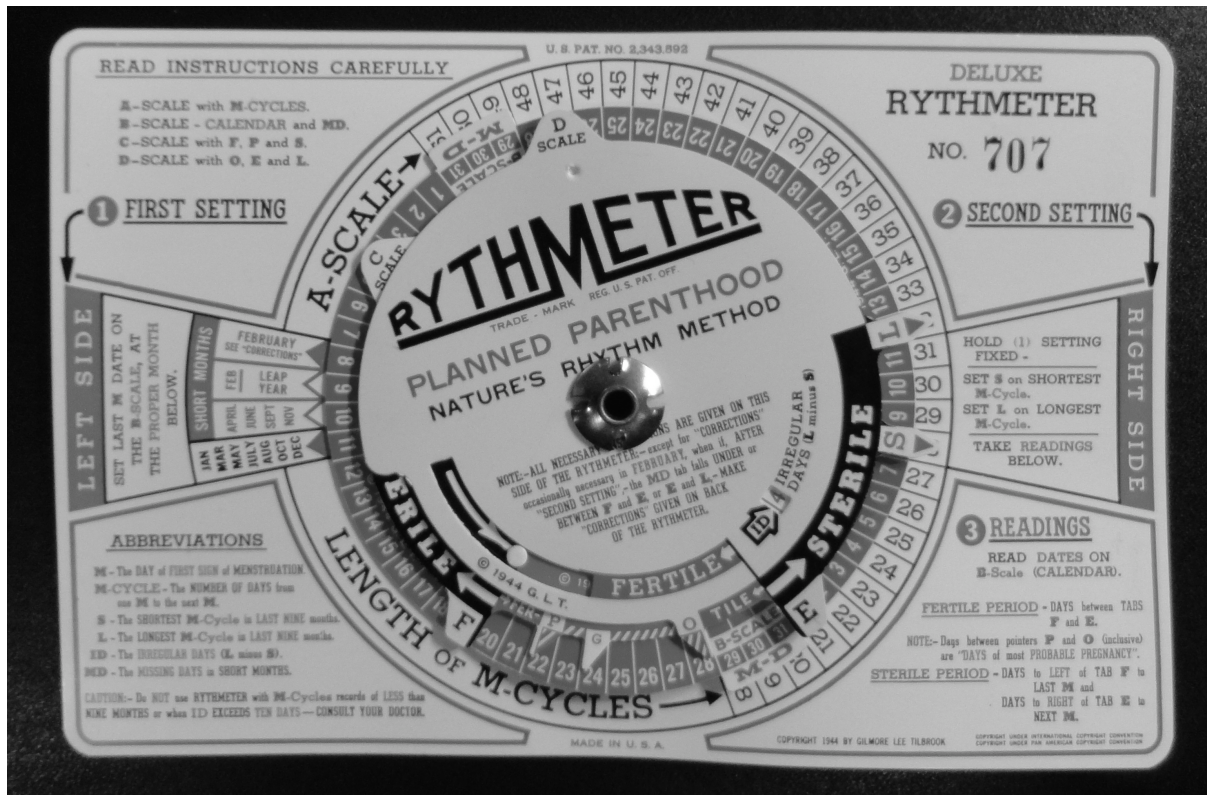


Figure 2.1



Conceptulator. Harvard Medical Library, Francis A. Countway Library of Medicine, Boston, Mass.

Figure 2.2.



Rythmeter. Harvard Medical Library, Francis A. Countway Library of Medicine, Boston, Mass.

Figure 2.3

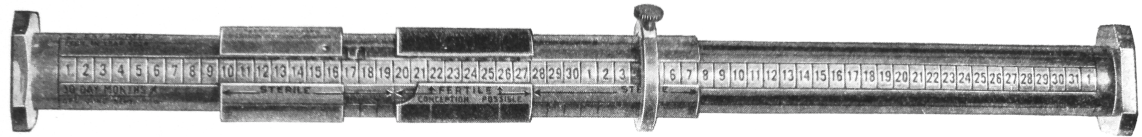
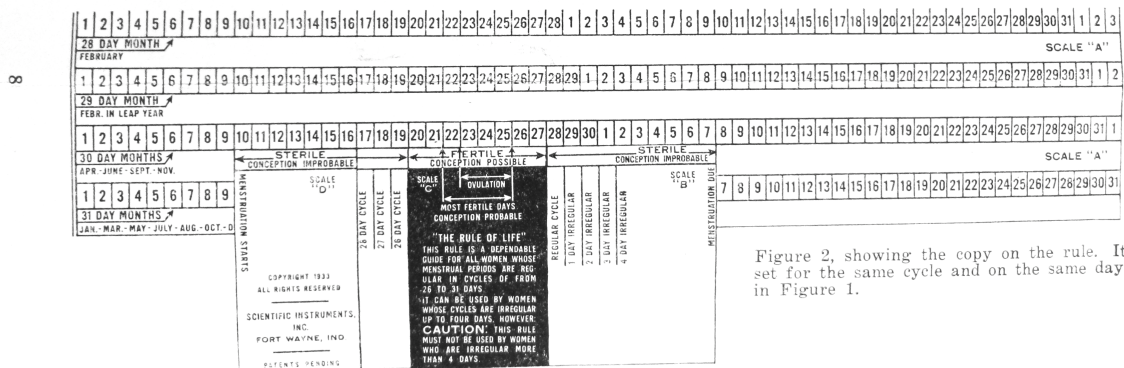


Figure 1, showing slide rule set for a normal 28 day cycle that is regular each month. It is set for a menstruation that starts on the 10th day of a 30 day month. The ring and set screw locks the carriage.



“The Rule of Life.” Harvard Medical Library, Francis A. Countway Library of Medicine, Boston, Mass.

Figure 2.4

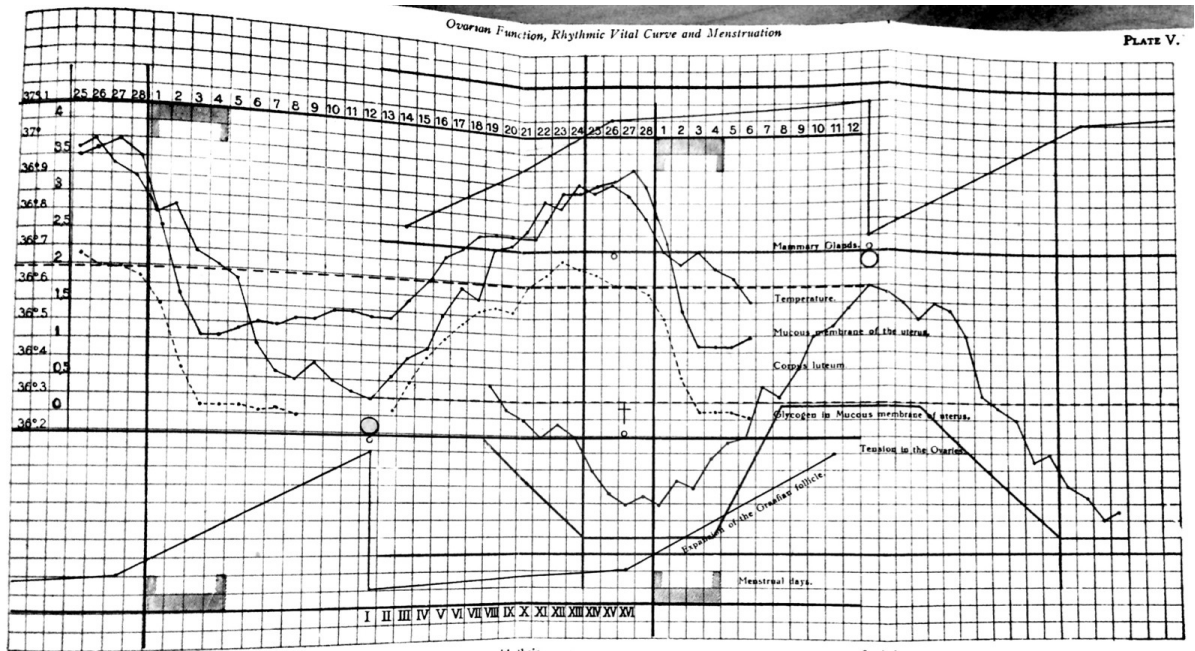


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Mother's temperature tracking chart. Edward Séguin, *Family Thermometry: A Manual of Thermometry for Mothers, Nurses, Hospitalers, Etc., and All Who Have Charge of the Sick and of the Young* (New York: G. P. Putnam & Sons, 1873).

## CLINICAL CHART

### OF VITAL SIGNS AND SEPTENARIES.

[illegible]

Figure 3.2

**DANGER SIGNALS OF DISEASE**



## Taylor CERTIFIED CLINICAL THERMOMETERS

They tell when you are in health and also show any indication of approaching illness. Any deviation from **Normal Temperature of 98<sup>3</sup>/<sub>8</sub> degrees** is a "Danger Signal" that should never be neglected.

As the barometer tells of the approaching storm, so does *The Taylor-Certified Clinical Thermometer* tell of approaching sickness. Take your temperature and that of your children regularly.

A Taylor-Certified Clinical Thermometer should be in daily use in every home, by every man and every woman, and for every child. It will be found the greatest safeguard of health.

The Taylor-Certified Clinical Thermometers are to be had at \$1.00 and \$1.25 (magnifying tube) each, from druggists generally, or will be sent, postpaid, on receipt of price, by

*Taylor Brothers Company.*

**ROCHESTER, N. Y.**  
NEW YORK CITY,  
85 Chambers St.

**LONDON, E. C.**  
103 Hatton Garden.

Each Thermometer is accompanied by 6 copyrighted clinical charts and a little book entitled "Danger Signals of Disease" showing the uses of the Clinical Thermometer. This booklet will be sent free postpaid to anyone who writes Dep. G & sends name & address.



Taylor Advertisement. *The Literary Digest* XXI, no. 11 (September 15, 1900).


Figure 3.3

PLAN OF THE MOTHER'S THERMOMETER.		
Degrees above 0. (thus written)	7	No well-authenticated recovery.
	6	Generally death.
	5	Often fatal.
	4	High fever.
	3	Considerable fever.
	2.5	Moderate fever.
	1.5	Slight fever.
	0	Standard of health, NORME.
Degrees below 0. (thus written)	.5	Sub-normal.
	1	Depression.
	2	Collapse.
	3 to 4	Algid collapse. [era.
	4 to 5	No known recov., except in chol-

Séguin's "Scale of Vitality." Edward Séguin, *Family Thermometry: A Manual of Thermometry for Mothers, Nurses, Hospitalers, Etc., and All Who Have Charge of the Sick and of the Young* (New York: G. P. Putnam & Sons, 1873).

Figure 4.1

16



### Health Thermometers

When the question of room temperature arises—which it does most frequently in the average family—it can be settled right if referred to that small arbiter, the Taylor health thermometer. Even more than family comfort hangs on its verdict; for overheated rooms mean reduced vitality, colds and diseases of the respiratory tract are caused in a large measure by overheating, while rooms below 68° entail colds and kindred ills. And there's big saving in daily fuel for the family that heeds its message.

#### STANDARDIZATION

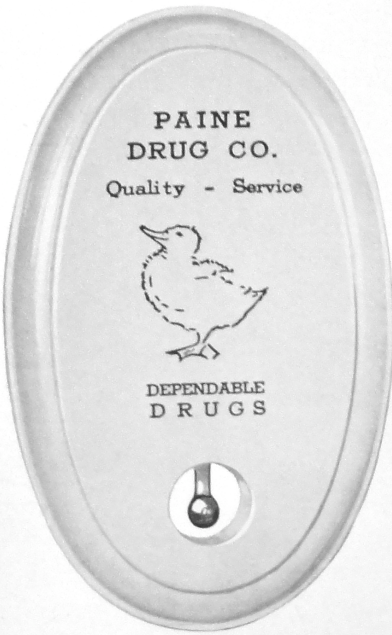
The successful merchant is the man who educates his customers to use brands he can honestly recommend. Selling a health thermometer—the market is there for a fever thermometer, for the window, for the bath.

*The advantages to the dealer who concentrates on Tycos, the advertised line is concentrated stock, faster turnovers and greater profit, and he contributes to home, health and comfort.*

Catalogue, 1927. Taylor Instrument Co. Papers, University of Rochester Campus Libraries Manuscript and Special Collections.

Figure 4.2

## TAYLOR BABY BATH THERMOMETER



BACK

**No. 561**

A new baby in a home means a potential customer for substantial amounts of drugs, food, dresses and all the hundred and one things that a baby must have. What could be smarter than going after this business with a goodwill gift of use both to the baby and the mother?

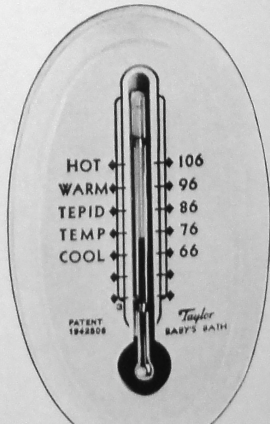
And what fills the bill better than one of these Baby Bath Thermometers? It tells the temperature of the bath, relieves the mother's mind, saves the baby's skin, and carries your message at one and the same time.

The advertisement goes on the back, as shown on the upper illustration. The finish is *either* pink or blue.

### SPECIAL OFFER

Many concerns have been so successful with the following plan, that we are now making it available for all of our customers. The purchaser orders a supply of baby bath thermometers. For each thermometer ordered we supply an appropriate letter of greeting to the new arrival. As birth announcements appear, or births are recorded, a letter is immediately sent, with a thermometer to the new comer. Results are immediate and phenomenal. Think of the possibility of this plan for druggists who sell baby supplies, milk dealers with a new active customer, banks on the lookout for new life-long accounts. Sell this *plan*. You'll find that the sale of thermometers will take care of itself, with ever increasing *repeat* sales.

If you want these letters, please state so on your order. Otherwise letters will *not* be sent.

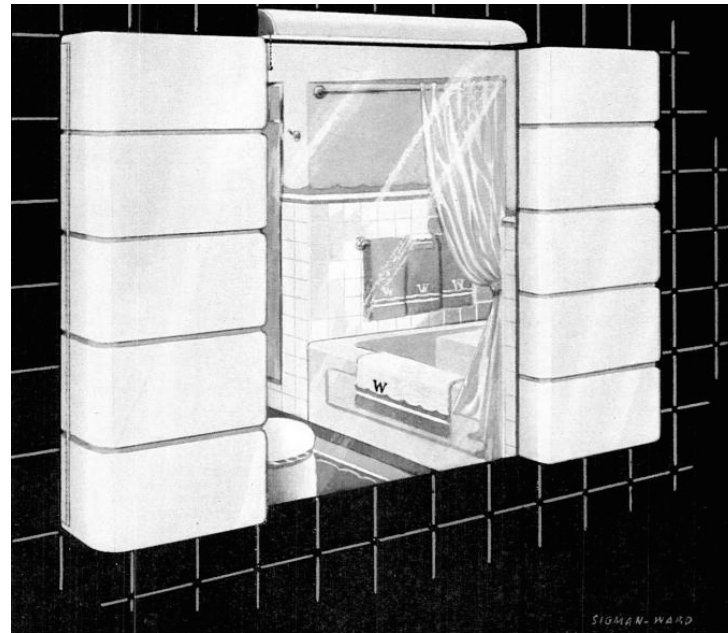


FRONT

Taylor Bath Thermometer. Taylor Instrument Co. Papers, University of Rochester Campus Libraries Manuscript and Special Collections.

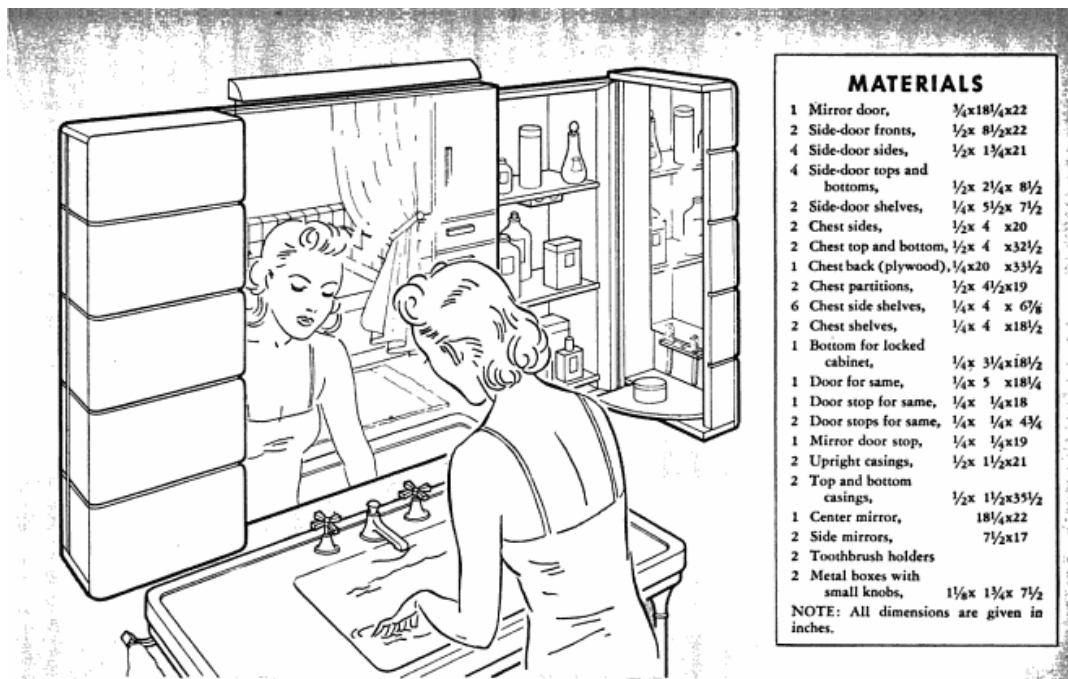


Figures 4.3 and 4.4



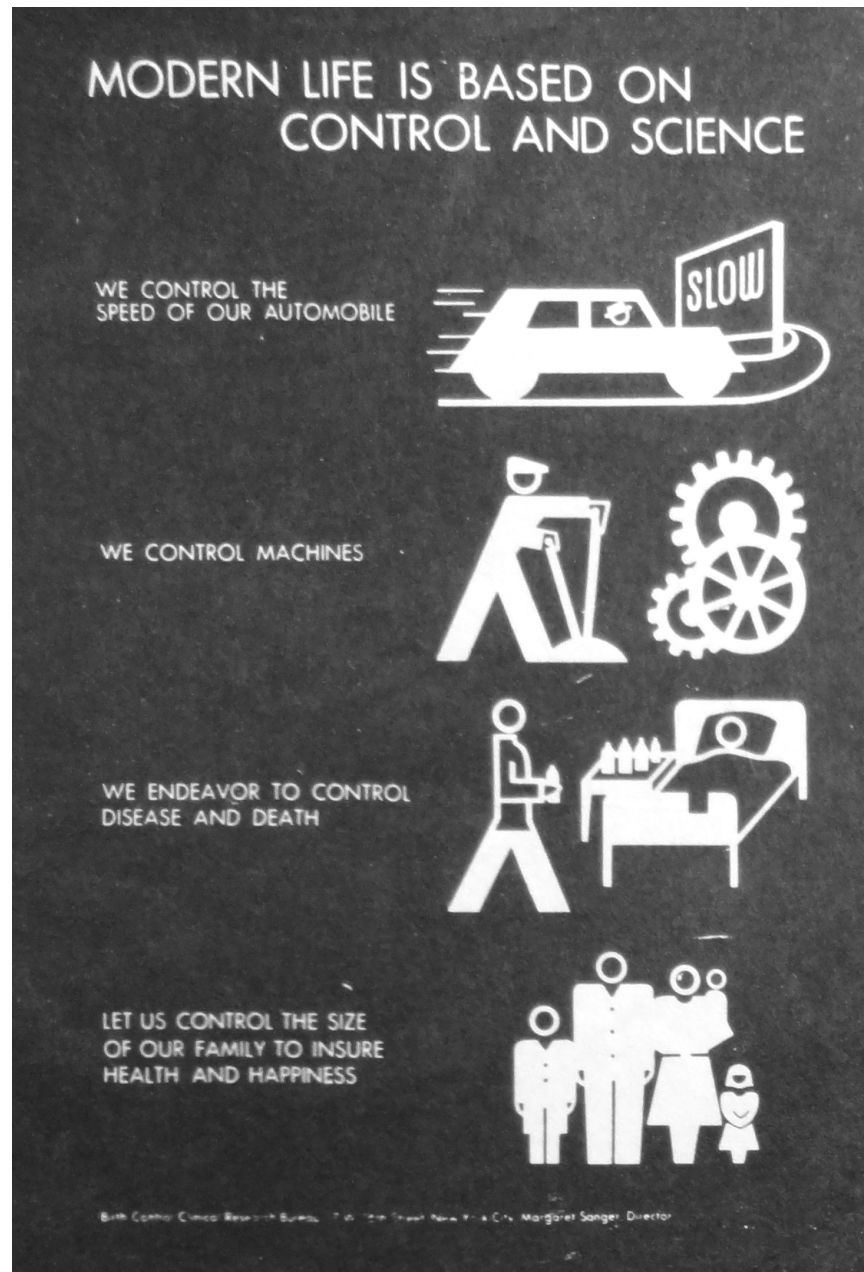
## Prize-Winning Medicine Cabinet

AS MODERN AS TOMORROW, THIS DESIGN TOOK FIRST HONORS



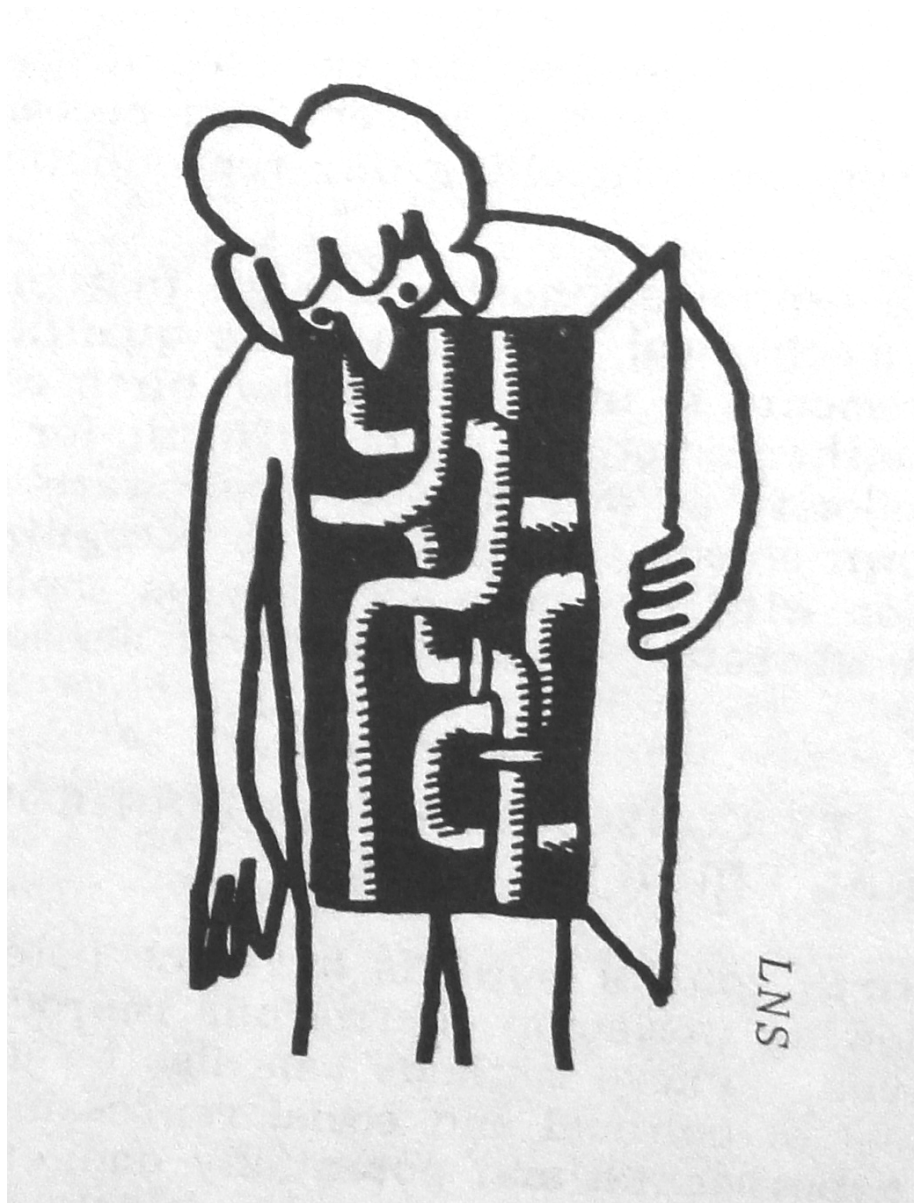
“Prize-Winning Medicine Cabinet,” *Popular Science Monthly*, May 1941.

Figure 5.1



Birth Control Clinical Research Bureau Poster 1938, Abraham Stone Papers, 1916-1959. H MS c157, Harvard Medical Library, Francis A. Countway Library of Medicine, Boston, Mass.

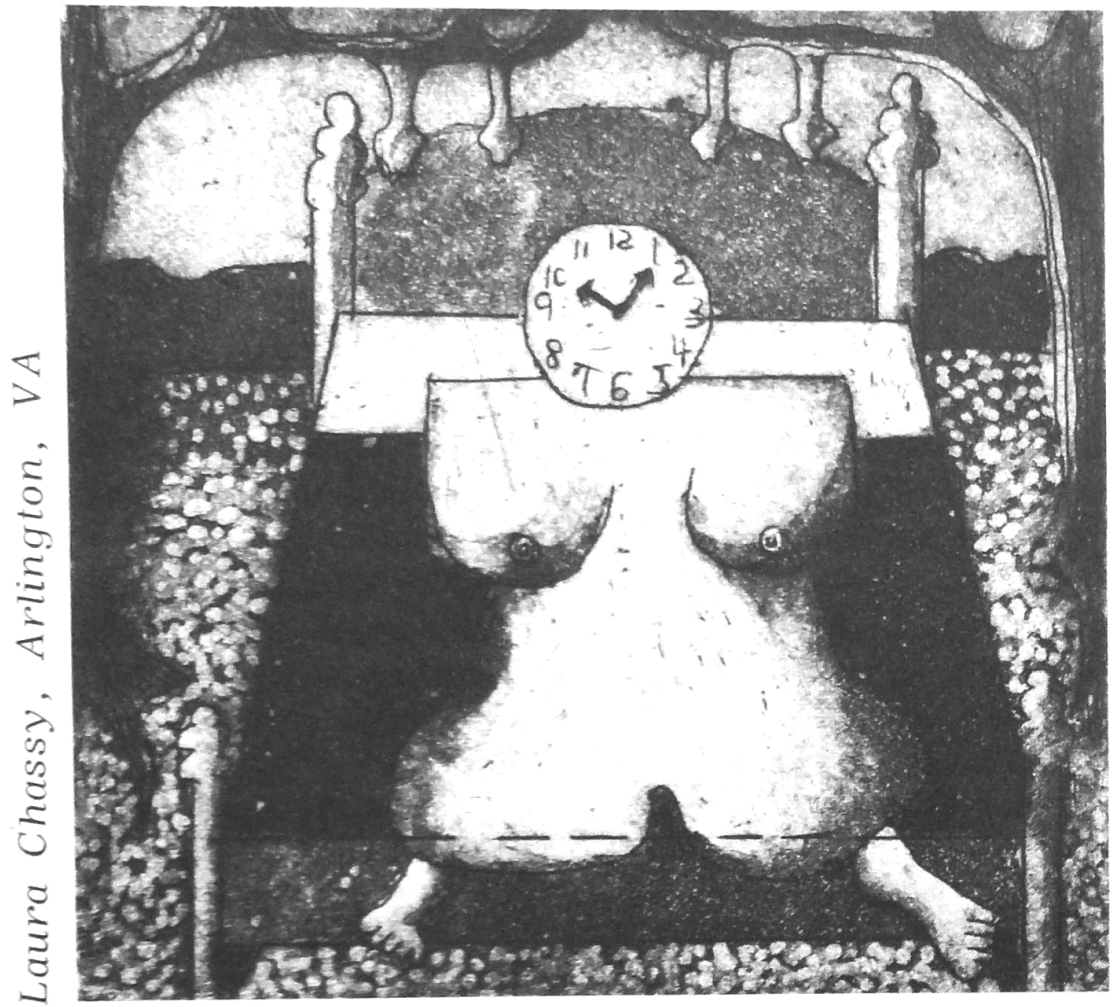
Figure 5.2



*Women: A Journal of Liberation.* Boston Women's Health Book Collective Records, Schlesinger Library, Radcliffe Institute, Harvard University.



Figure 5.3



*Women: A Journal of Liberation.* Boston Women's Health Book Collective Records, Schlesinger Library, Radcliffe Institute, Harvard University.

**Figure 5.4**



Baby-Comp fertility computer. (The Lady-Comp fertility computer is functionally identical to the Baby-Comp, with the branding and indicators switched.) Lady-Comp.com

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