

8-2014

Chiasmic Rhetoric: Alan Turing Between Bodies and Words

Patricia Fancher

Clemson University, fancher.patricia@gmail.com

Follow this and additional works at: https://tigerprints.clemson.edu/all_dissertations

 Part of the [Rhetoric and Composition Commons](#)

Recommended Citation

Fancher, Patricia, "Chiasmic Rhetoric: Alan Turing Between Bodies and Words" (2014). *All Dissertations*. 1285.
https://tigerprints.clemson.edu/all_dissertations/1285

This Dissertation is brought to you for free and open access by the Dissertations at TigerPrints. It has been accepted for inclusion in All Dissertations by an authorized administrator of TigerPrints. For more information, please contact kokeefe@clemson.edu.

CHIASMIC RHETORIC: ALAN TURING BETWEEN BODIES AND WORDS

A Dissertation
Presented to
the Graduate School of
Clemson University

In Partial Fulfillment
of the Requirements for the Degree
Doctorate of Philosophy
Rhetorics, Communication, and Information Design

by
Patricia Fancher
August 2014

Accepted by:
Dr. Steven B. Katz, Committee Chair
Dr. Diane Perpich
Dr. Cynthia Haynes
Dr. D. Travers Scott

DISSERTATION ABSTRACT

This dissertation analyzes the life and writing of inventor and scientist Alan Turing in order to define and theorize chiasmic relations between bodies and texts. Chiasmic rhetoric, as I develop throughout the dissertation, is the dynamic processes between materials and discourses that interact to construct powerful rhetorical effect, shape bodies, and also compose new knowledges. Throughout the dissertation, I develop chiasmic rhetoric as intersecting bodies and discourse, dynamic and productive, and potentially destabilizing.

Turing is an unusual figure for research on bodily rhetoric and embodied knowledge. He is often associated with disembodied knowledge and as his inventions are said to move intelligence towards greater abstraction and away from human bodies. However, this dissertation exposes the many ways that bodies are active in shaping and producing knowledge even within Turing's scientific and technical writing. I identify how, in every text that Turing produces, chiasmic interactions between bodies and texts actively compose Turing's scientific knowledge and technical innovations towards digital computation and artificial intelligence. His knowledge, thus, is not composed out of abstract logic, or neutral technological advances. Rather, his knowledge and invention are composed and in through discourses and embodied experiences. Given that bodies and discourses are also composed within social and political power dynamics, then the political, social, and personal embodied experiences that compose Turing's life and his embodiment also compose his texts, rhetoric, inventions, and science.

In Chapter 1, I introduce Alan Turing and the significance of my research for the fields of rhetoric of science and technology, body studies, and also for our understanding of Alan Turing's technical writing. In Chapter Two, I first show that antithesis has been the primary figure representing the dichotomy between bodies and knowledge. However, I also draw from feminist science studies and a style analysis of Turing's essay "Nature of Spirit" to demonstrate that a strong antithesis between bodies and mind can never be maintained: bodies can never be totally excluded and bodily presence is rhetorically significant. In Chapter Three, I define how bodies are always already connected with discourse: the two can never be separated. In Turing's article "On Computable Numbers with an Application to the Entscheidungsproblem," the intersection between bodies and texts is significant in the way that Turing draws from his embodied experience performing calculation in order to invent the Turing Machine, which became an important theoretical foundation for digital computation.

In Chapter Four, I argue that the chiasmic relation between bodies and texts is dynamic and productive. The dynamic chiasmus in Turing's article "Intelligent Machinery" reveals the ways that Turing's embodiment as a homosexual man in England in the 20th century informs his early proposals for how to develop artificial intelligence. In particular, the very same disciplining—through intervention and a focus on the body—that compose Turing's embodied experiences as a subject of sexuality and governmentality also composes Turing's proposal for constructing intelligence in machines. In Chapter 5, I posit that Turing rhetorically constructs a disruptive notion of

machine intelligence that is embodied, feminine, and performative or imitative. This finding is of particular importance in the field of science and technology, which is predominantly known for excluding women as well as qualities associated with femininity. Turing disrupts traditional expectations in technical writing by feminizing the machine. His article “Computing Machinery and Intelligence” disrupts traditional definitions of intelligence by making femininity, fallibility, and embodiment central components that qualify a machine as an intelligent being. In Chapter 6, I conclude by demonstrating the importance of chiasmic relations between bodies and texts for technical writing broadly, including the teaching of technical writing. Then I end by proposing a pedagogy of care and disorientation that are attuned to the complex embodiment of students interacting with texts in our composition classrooms.

ACKNOWLEDGEMENTS

When I started this project, I could not have imagined all that I have been able to accomplish in this dissertation. For his role helping me develop as a scholar, I must thank Dr. Steven Katz—mentor and friend—who saw my potential and pushed me to reach that potential. Steve Katz sets a high standard for scholars and he helped me reach that standard. I am ever thankful and will never be the same. To my committee, Dr. Cynthia Haynes, Dr. Diane Perpich, and Dr. Travers Scott, I thank you for the support, encouragement, challenges, time, and energy. With each meeting, each of you helped me to understand why this research is significant and how I can work to develop its significance. Cynthia Haynes, I survived this past year with the help of your smile, laughter, and embrace. I aspire to emulate your example of what a woman scholar can achieve. I would not be here without Victor Vitanza, who always trusted and valued my embodied knowledge. I thank VV for the dis/orientations that brought me so far. I also thank the Potent Object Project and Brent Pafford. This project saved me from the isolation of dissertating and enriched my days with stories, communities, friends, voices, hands, coffee, and so many many mugs.

The Society of the Third Sophistic has been my intellectual family who supported and challenged me for the past four years. And they will continue to be my intellectual family as I continue my scholarship. I am especially indebted to Dr. Jared Colton and Dr. Glen Southergill, who read so much of my writing for 4s years and responded generously, even when none of us was sure what I was doing. I have so many friends who have loved, supported, listened, and cared for me. Without them, I would not be who

I am. I thank Christina Hung for burying me in books and the many other art-practice coping mechanisms. I thank Per Hoel. Somehow, we made it through together. I could have done it without him, but I would not have been able to preserve my joy, smile, and passion.

TABLE OF CONTENTS

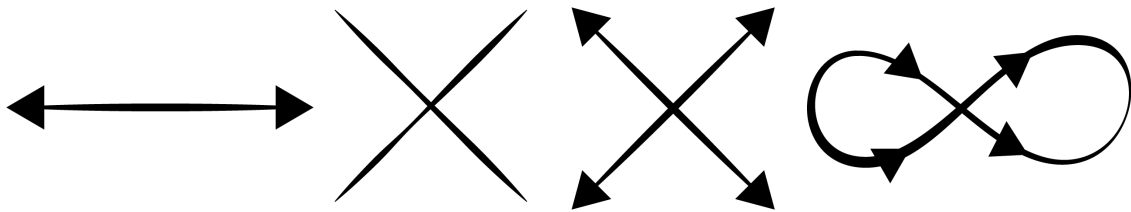
| | Page |
|---|------|
| TITLE PAGE | i |
| ABSTRACT | ii |
| ACKNOWLEDGMENTS | v |
| CHAPTER | |
| I. CHIASMIC RHETORIC..... | 1 |
| Constructing Alan Turing..... | 6 |
| Tracing Bodies in Philosophy and Rhetoric..... | 11 |
| Chiasmus and Embodiment..... | 21 |
| Chapter Overview | 27 |
| II. PRODUCING ANTITHESIS THEN BREAKING ANTITHESIS | 30 |
| Turing’s Education..... | 32 |
| Alan Turing’s “Nature of Spirit” | 34 |
| Form and Rhetoric of Antithesis..... | 42 |
| Identifying Antithesis in “Nature of Spirit” | 47 |
| Movements of Antithesis | 52 |
| Feminist Critiques of Antithesis..... | 54 |
| Losing Antithesis in “Nature of Spirit” | 62 |
| From Antithesis towards a New Figure..... | 64 |
| III. INTERSECTING BODIES AND DISCOURSE | 67 |
| Defining Chiasmus..... | 70 |

| | | |
|-----|---|-----|
| | Universal and Relative Schools of Mathematics | 74 |
| | Chiasmus between Antithesis and Parallelism | 81 |
| | Bodies in Turing’s Mathematics | 82 |
| | Chiasmus Taking Space and Connecting | 85 |
| | Turing Turns Towards Bodies..... | 97 |
| | Intersecting Bodies without Differences | 104 |
| IV. | DYNAMIC EMBODIMENTS..... | 108 |
| | Dynamic Chiasmus | 109 |
| | Dynamics of Biopolitics | 112 |
| | Turing in Transition | 118 |
| | Biographies Constructing Sexuality..... | 121 |
| | Machines in Transition..... | 124 |
| | First Manifest on Artificial Intelligence..... | 128 |
| | Sexuality and Knowledge Production..... | 132 |
| | Analysis of Intelligent Machines and Biopower..... | 134 |
| | Embodying Turing Within Intelligent Machinery..... | 143 |
| | Constructing Posthuman Bodies in the Empire | 146 |
| | Biopower and the Punishment of Alan Turing..... | 151 |
| V. | DESTABILIZING FORMS..... | 158 |
| | Turing Moves Toward Machine Intelligence..... | 160 |
| | Destabilizing Chiasmus | 162 |
| | Critiques of Machine Intelligence | 165 |
| | Dynamic Rhetoric | 168 |

| | |
|--|-----|
| Dynamic Rhetorical Bodies | 172 |
| Later Critiques of Machine Intelligence..... | 176 |
| Computing Machinery and Intelligence..... | 178 |
| Gendering The Turing Test..... | 182 |
| Turing at the Beginning of Posthumanism..... | 189 |
| Gendering Intelligence..... | 194 |
| | |
| VI. COMPOSING WITH CHIASMUS | 198 |
| Uncovering Bodies..... | 201 |
| Bodies in Composition Theory | 207 |
| Chiasmic Pedagogy..... | 212 |
| | |
| REFERENCES..... | 217 |

CHIASMUS 1: CHIASMIC RHETORIC

“Write yourself. Your body must be heard.” Cixous
“Language has all the suppleness of human flesh, and something of its warmth.” Quinn



In this dissertation, I analyze the interactions among the life and the writings of Alan Turing, who has been celebrated as a father of computer science, honored as a British war hero for his work as a cryptologist in WWII, and is one of the many victims of British laws criminalizing homosexuality. This research focuses on the intersections and interactions between the body of the scientist and the writing of science. In order to investigate these intersections and interactions, I demonstrate that the rhetorical figure chiasmus—which is significant in rhetorical theory, literary theory, and gender theory—is a productive heuristic for analyzing the relations between bodies of flesh and bodies of texts. Chiasmus is a rhetorical figure that connects two phrases so that the phrases are balanced and at the same time the phrases can be dissimilar or even antithetical. For example, Isaac Newton illustrates his law of motion: “if you press a stone with your finger, the finger is also pressed by the stone.” For theorists of gender and bodies,

chiasmus also figures relations between bodies and discourses that are dynamic and co-constructing. As I develop and explore increasingly complex notions of chiasmus; so too, the relations between bodies and discourse become increasingly complex.

Chiasmic rhetoric, as I develop it from both rhetorical theory and feminist theory, is composed of dynamic processes between materials and discourses that interact to construct powerful rhetorical effect, shape bodies, and also compose new knowledges. I define chiasmic rhetoric as the rhetorical effects of the relations between bodies and discourse. And these chiasmic rhetorical effects aid in constituting knowledge.

Throughout the dissertation, I develop chiasmic rhetoric as 1) intersecting (bodies and discourse) 2) dynamic, which is to say productive, 3) potentially destabilizing. I'll develop each of these movements of chiasmic rhetoric in chapters 3, 4, and 5. This dissertation develops a theory of chiasmic rhetoric by drawing upon definitions of bodies in relation to discourse posited by gender theorists, especially Judith Butler, Elizabeth Grosz, and Karen Barad. These feminist theorists present definitions of bodies that intersect with discourse in order to compose bodies as well as compose knowledge. In this definition, discourse and bodies are intersecting and interacting, yet also diverging from or exceeding each other. Each singular body is the product of the unique interactions and relations between unique material bodies and shared but complex linguistic construction. Through the interactions between language and bodies, chiasmic rhetoric produces powerful, materially embedded rhetorical appeals. In order to develop a notion of chiasmic rhetoric, I posit that rhetoric, especially rhetoric of science, can benefit from more complex theories of bodies, especially theories grounded in feminist and

gender theory, that make visible the significance of embodiment for knowledge production.

In this way, too, chiasmic rhetoric will move to show how the gap between bodies and knowledge, first opened by Plato, can be moved ever closer towards closure.

Through this dissertation, I demonstrate that the chiasmic rhetoric of Alan Turing's particular embodied experiences contributes toward the process of his inventive and insightful scientific and technical work. At the same time, his education, research, and disciplinary training also function as technologies of the body that co-construct Turing's embodied experiences.

Regarding our knowledge of bodies in rhetoric, this dissertation contributes to the fields of rhetoric and composition, especially in technical and scientific writing and rhetoric, by analyzing how a body's particularity and uniqueness shape the composition and the content of text and technical knowledge. This project demonstrates how Alan Turing's bodily particularity and uniqueness shape the composition and content of his texts that contribute towards the development of digital computation. By interpreting the chiasmic relations between bodies and rhetoric, we can see not just what we know, but also how we know through rhetorical forms.

I am glad to be placing the rhetorical forms at the center of this project. Often, when scholars of rhetoric turn towards bodies, ontology, or epistemology, they also move away from the nuts and bolts of rhetoric and language—like structure, rhetorical forms, and style. The performative critique of Luce Irigaray demonstrates that male philosophers have not only composed arguments that exclude women, but that these men have also

performed masculine embodiment in the form, style, and syntax of their compositions. I show that by turning towards bodies in rhetoric we can also turn towards the material or formal aspects of rhetoric and language. Both the form of bodies and the form of language actively contribute to the meaning and knowledge we construct.

In addition, this project contributes toward current scholarship on the rhetoric of science and technology. For over 20 years, rhetoric of science scholars have demonstrated the ways that scientific discourse as well as scientific facts are embedded in and produced through rhetoric (Bazerman, Myers, Campbell, Fahnestock). Gross makes a stronger claim that rhetoric is constitutive of scientific knowledge (*Rhetoric of Science*; cf. *Starring the Text*). Marcello Pera also makes this argument but extends the role of rhetoric into the very methods and logic of scientific reasoning and discovery. Although Gross recently argued for a more moderate version of this claim (*Starring the Text*), the field and also science studies more broadly have continually shown how our scientific knowledges are inseparable from the words, figures, forms, and strategies of composing science in discourse (Taylor). This dissertation focuses on the deep, meaningful relations between Turing's embodiment and the construction and composition of his scientific and technical knowledge. This contribution demonstrates that all knowledge is constructed by particular bodies in particular contexts, and that the political, social, economic, gendered, raced, and sexualized particularities of those bodies also form the knowledge. My inclusion of bodies into the rhetoric of science is significant because these bodies co-construct powerful rhetoric and new knowledge, and with the exception of feminist

science studies, studies of the rhetoric of science and technology have not considered embodiment as a active or productive aspect of scientific and technical discourses.

I am not, however, attempting to contribute to current debates and discourses on Turing's biography or his technical innovations. Volumes of work have already been published that detail Turing's biography; of those Andrew Hodges' biography is doubtless the most detailed, complex, and scholarly. In addition, volumes of work have already been published on Turing's theoretical contributions to mathematics, computer science, and artificial intelligence. B. Jack Copeland and his frequent co-author Diane Proudfoot are the leading experts on Turing's writing and inventions. Certainly the conversation that Turing initiated on artificial intelligence has also generated volumes of theoretical scholarship. I draw on all of this scholarship, but my primary contribution towards an understanding of Turing is informed by rhetorical theory as well as theories of bodies and gender. My research is the first to analyze Turing's embodied experience and his rhetorical practices. Instead, I am contributing to scholarship on Turing by demonstrating how his rhetoric and his embodied experiences constitute his technical invention and scientific knowledge production.

This dissertation challenges the common understanding of Turing as a figure who erases bodies with digital technology and artificial intelligence. Granted, some claims that Turing disembodies knowledge are, on the surface, justified: Turing moved computation out of the hands of men and women and into a computer, and he challenged the humanist claim that we are the sole owners of intelligence when imagined machines could be trained to demonstrate intelligence. In this way, he is seen as complicit in a

broader shift toward digital technology, which is also seen as a shift away from human bodies. In order to complicate this narrative about disembodiment and digital technology, I analyze Turing's writings and embodied experience as they move towards and then beyond the invention of digital computation. My analysis demonstrates that Turing was far from a disembodied, abstracting inventor. The opposite is true: Turing's texts are lively with bodies and always connected with his embodied experience. Specifically, this research demonstrates the ways that his thinking and his writing are fully integrated and co-constructed with his particular embodied experiences. More broadly, these arguments contribute towards technical communication and digital technologies. This dissertation asserts that all modes of communication and even all modes of invention are always already embodied and material. Finally, while other scholars of science and technology have demonstrated the ways that technology has been discursively coded as masculine and an extension of masculine strength and drive to control (see Easlea; Cockburn; Seidler; Grint and Gill), this research highlights a unique and disruptive moment in the history of computing in which both engineer and technology were coded in feminine ways. Erin Manning and Brian Massumi point towards the embodied context of knowledge when they write, "concepts must be experienced. They are lived." In the figure chiasmus, bodies and discourses intersect and interact with rhetorical effect and knowledge production even in the most abstract discourses of mathematics and digital computation.

Constructing Alan Turing

Constructing his Role in Computer Science

Alan Turing, born in 1912 and deceased in 1953, is a disputed ‘father’ of digital computation. Beyond his various involvements with the community of inventors working towards digital computation, strong defenders of Turing’s legacy stress that Turing contributed the vision or insightfulness that paved the way for other inventors (Copeland “Turing after the UTM”). In particular, Turing’s 1936 article “On Computable Numbers with an Application to the Entscheidungsproblem” is often cited, including by Von Neumann, as a theoretical foundation for digital computation. Hodges, one of Turing’s most committed advocates, praises Turing “as one of the very few who had the vision, it fell to Alan Turing to force the British government into the modern world” (219). Agar suggests that, although Turing did not directly work on the Colossus (the computer built at the British Government Code and Decipher School to decrypt German messages during WWII), Turing influenced its construction because the computer “was a symbol-processing device that immediately recalled the imaginary machine [Turing] had conjured up in his 1937¹ paper” (111-112). Leavitt also gives Turing credit for his conceptual contribution towards computation. Leavitt seems to dismiss von Neumann’s contributions by writing that the US Electronic Numerical Integrator And Computer (ENIAC), fully functional by 1947, was “von Neumann’s apparent wholesale appropriation of [Turing’s] ideas” (201). Likewise, Dyson also grants Turing the role of the conceptual father of digital computation, while portraying von Neumann as the a

¹ The date of “On Computable Numbers” is often cited incorrectly. Its original publication date is in November 1936.

brilliant and more business savvy opportunist. Biographers reconstruct Turing as a genius, but because he preferred to work with numbers and machines rather than people, he remained overlooked by historians. In addition, these accounts often point to his personal queerness as a sign of social awkwardness that made him reticent to appear in public. While these claims about why Turing may have failed to gain recognition may generally be valid, he did gain public attention as first a war hero and then as an inventor. He frequently appeared on radio shows and public debates, although his performance was often critiqued as awkward or so technical he was incomprehensible. In these accounts of Turing's legacy, biographers also reconstruct a stereotype of the solo genius whose commitment to knowledge is praised while individuals like von Neumann are often characterized as power hungry or even narcissistic. Nevertheless, Turing's name has never been on a major computer patent and for many years his contributions towards computers were left unrecognized.

The debate over Turing's contribution towards the digital computer continues: Just this year, Thomas Haigh published, "Turing Did Not Invent the Computer" in *Communications of the Association for Computing Machinery*. In order to support this denial of Turing's contributions, Haigh separates computer science from computing technology. Grounding his argument in a bifurcation of theory and practice, Haigh claims that while Turing did publish some of the most significant foundational texts in computer science, he did not directly invent any computer². Haigh's distinction between theoretical

² This claim is debatable. Turing worked on Computers for the British Code and Decipher School, the National Physics Lab, and the University of Manchester. However,

and technical advances is anachronistic. Although commonplace in contemporary computer science, in the 1940's and 1950's, especially in the midst of WWII, theorists like Turing designed, built, and operated computing technologies. Haig critiques Copeland for conflating theory with practice. This paradigm difference between the theoretical advancements and the technical advances are commonplace in contemporary computer science. However, Turing certainly didn't know the difference. In the 1940's and 1950's, especially in the midst of WWII, the theorists like Turing designed, built, and operated computing technologies.

Constructing his Sexual Identity

In addition to being the object of debate in the history of computing, Turing is also well known as a tragic victim of anti-gay laws in England, under which Turing was sentenced and punished with chemical castration. This punishment was levied against Turing after he was arrested under "gross indecency" laws in 1952. Unwilling to admit that homosexuality was a crime, he did not deny the accusation nor did he defend himself. He was sentenced to one year of estrogen treatment, which was essentially a form of chemical castration. Just one year after the sentence of estrogen injections was complete, he apparently committed suicide from ingesting cyanide. Although many details of Turing's life are debated, none is so adamantly or as inconclusively debated over whether he committed suicide or if he accidentally poisoned himself. In 2009, Prime Minister

his name was never on a patent nor was he ever the lead designer of the final version of any of these particular computers.

Gordon Brown issued an apology to Alan Turing. And on Christmas Day 2013, while I was writing this dissertation, Alan Turing was officially pardoned.

Although this is a well-documented fact, Turing biographers and scholars commonly refrain from making mention of his sexuality except in reference to his trial and then later his death. For instance, although Copeland was one of the most prominent advocates soliciting the British government for Turing's pardon, in his scholarship on Turing's theories and intentions, Copeland never mentions Turing sexuality and seldom mentions his personal life. Whitby, Haig, Dyson and many others who do discuss Turing's personal life, still do not discuss his sexuality unless it is in reference to Turing trial and his death. Here are two notable exceptions. Hodges' biography is by far the most complex and unapologetic account of Turing's sexuality. Leavitt also states that his primary goal in writing Turing's biography is to repair the previous problematic accounts of Turing's life, sexuality, and thinking. In this dissertation, I discuss Turing's embodiment in chiasmic relation to his writing and technical invention. And this embodiment does include some discussion of his sexuality. However, I must insist that, as we move to include Turing's body more fully, that we do not reduce his embodiment exclusively to his sexuality. This is important because Turing's embodiment is complex and includes many diverse experiences. Nevertheless, heteronormativity and the construction of sexuality do not only regulate sexual practices but also practices that form subjectivity more generally. Hence—in the chiasmus between Turing's embodiment and his discourse—his sexuality as well as his gender do play a prominent role.

Tracing Bodies in Philosophy and Rhetoric

The connections I draw between bodies and rhetoric in Turing's text are not new; a connection between bodies and rhetoric can be seen throughout the history of Western philosophy. Since Plato, bodies and rhetoric have shared similar fates in relation to Truth. For instance, in the *Phaedrus*, Plato ranks souls according to their proximity to truth and knowledge. Obviously, the philosopher was at the very top of the list. The sophists—those who made a profession out of teaching the art of oratory and persuasion—were ranked nearly at the bottom, just slightly better than the tyrant. Those who work with their bodies primarily, laborers and craftsmen, were ranked just slightly higher in the proximity to truth. In Plato's ranking, we find that those who build their craft primarily with their words or bodies are both alienated from true wisdom. This is because, for Plato, both bodies and language are just temporary, worldly representations. The body is a burden and obstacle for the soul of the person. Likewise, a word is a mere mimicry or representation of a true form. This treatment of bodies and rhetoric became one of Plato's most widely adopted legacies.

In *The Advancement of Learning*, Bacon re-reads the people of his day back into Plato's cave where they are chained and blinded by pretty words, bodily pleasures, and superstition. Bacon develops a method of inductive logic that attempts to free the thinking man from the trappings of language and his subjective bodily perspective (while acknowledging their existence as necessary "Idols" in human life). Rene Descartes also holds that language and bodies distract from knowledge. His method of deduction begins by doubting bodily senses, including sight. Like dialectic for Plato and induction for

Bacon, deduction offers for Descartes a way to move beyond the burden of bodies and words towards pure logic and cognition.

Notably, rhetoric is often explained metaphorically as a woman who uses her body to distract and pacify men from doing serious intellectual work. For instance, John Locke wrote, “eloquence, like the fairer sex, has too prevailing beauties in it to suffer itself ever to be spoken against. And it is in vain to find fault with those arts of deceiving, wherein men find pleasure to be deceived” (book III). The assumption here is that their bodies primarily define women. In this metaphor, rhetoric, like a woman’s body, is only useful for simple, superficial pleasure. So rhetoric and women's bodies pose the same threat—they both focus on bodies, pleasure, and sensation. Bodies and rhetoric were opposed to serious knowledge that was understood as transcendent or superior to experiences of pleasure through bodies and words.

Bodies in Relation to Reason

The work of feminist philosophers helps to explain why and how bodies were excluded from philosophy and Truth. Notably, Genevieve Lloyd argues that the very definitions of reason are dependent on excluding bodies, material, and also women. This exclusion of bodies from the definition of reason, however, does not mean that bodies play no part in the development of theories of reason, logic, and knowledge. No, the opposite is case. She explains that the very definition of reason is dependent on first developing restrictive definitions of bodies.

For Plato, reason either transcends bodies or the two are defined as opposites or in conflict (Lloyd 207). In the *Phaedrus*, for instance, bodies are compared to an ignoble horse that fights against the controlling reason and knowledge of the charioteer, which represents the rational, wise soul. Bodies are temporary, volatile, and natural. Reason, on the other hand, transcends and controls everything that is associated with bodies. Lloyd demonstrates that if bodies are defined as temporary, volatile, and natural, then reason is defined as eternal, stable, and cultivated or heavenly. This is not the only way that philosophers have separated bodies from reason.

Lloyd also explains that the Enlightenment with its development of scientific methods used a different logic to separate bodies from reason. For instance in the writing of Francis Bacon, knowledge is the power to control and master nature, which contains no reason or intelligence. The physical world and knowledge are not necessarily battling against each other as we see in Plato. Nevertheless, the physical world and knowledge are defined as opposites: the physical is devoid of reason, and reason is the power to control the physical (Lloyd 10-17). Although different philosophers have conceived of varying relations between bodies and reason, Lloyd argues that what these different notions have in common is that after first defining bodies, reason stands in for all that is definitionally opposed to bodies. This definitional opposition allows philosophers to conceive of reason and logic as transcendent from bodies.

Although bodies are excluded from the definition of reason, philosophers nevertheless devote extensive attention to discussing and defining bodies. These same men—Plato, Descartes, Francis Bacon—who exclude bodies from reason and

philosophy, also theorize bodies, especially how to manage, regulate, control, and discipline bodies. For instance, Descartes, the famed father of modern philosophy, excludes bodies in his *Meditations* by creating a rigid distinction between mind and body. Lloyd explains that this sharp distinction between body and mind is crucial for the development of his scientific method, which utilizes the pure intellect of the mind and excludes the sensations of bodies (45). However, Descartes also wrote extensively on bodies. In his treatise *Passions of the Soul*, he defines bodies as “everything that can be observed in us that is opposed to our reason” (365.5). According to this text, our bodies are machines that regulate our sensations and passions so that our logical, rational minds are left pure from our animal-like passions (354.10-355.10).

Feminist Critique of Reason/Body Antithesis

This mind/body dualism has been consistently critiqued for centuries. Significantly, feminists identify ways that women have also been separated from knowledge in this binary. For this project, it is important to note two main lines of critique.

First, the split between mind and body is challenged because it is not logically or ontologically viable. Moira Gatens interprets the theories of Benedict Spinoza to remind us that his thinking, even back in the 17th century, collapsed the binary between mind and body and between reason and emotion. Gatens explains that Spinoza’s ethics associate rationality and intellect with kinds of lived, bodily activities. Thinking is a kind of action or mode of being that the mind performs (Gatens 61). Understood this way, reason cannot be separate from bodies because reason requires a body to act and think.

Because humans can only know or think through and in our bodies, we can also improve our knowledge and rationality by better understanding our bodies, rather than transcending our bodies as Descartes would suggest. In addition, Lloyd demonstrates that reason and logic have never been disembodied. Rather, reason and logic have been consistently defined in opposition to anything feminine. The so-called universal subject and objective logic are neither universal nor objective, but instead conform to masculine characteristics and value masculine subjects (Lloyd iii-x).

Second, Cartesian dualism is critiqued because, despite Descartes' intention to include women and men equally in this 'universal' reasoning, his commitment to split body and mind actually reifies male dominance and female exclusion or subordination. Bodies are first defined as separate from reason. Then, femininity is also defined as opposed to reason because femininity is associated with bodily pleasure, birth, emotion, and other corporeally-bound experiences. As Lloyd argues, because reason is defined in opposition to the feminine, then to achieve rational thought we must first transcend or exclude anything defined as feminine. Her argument demonstrates how the very definition of reason preserves power relations that give men dominance and superiority as more rational beings (103).

After identifying the problems with our definitions of bodies, gender theorists, especially Judith Butler, Elizabeth Grosz and Karen Barad, have worked to address this problem by redefining bodies as meaningful, volatile, relational, and even agential. While I engage in a detailed discussion of these definitions of bodies progressively in each chapter of this dissertation, for now, these philosophers are significant because they all

move towards new definitions of bodies. I connect these feminist definitions of bodies with rhetorical theory in order to develop a notion of chiasmic rhetoric as a process of interacting and co-constructing bodies and discourse. With this notion of chiasmic rhetoric, I analyze Turing's texts in order to demonstrate how the intersections between his embodiment and his compositions compose Turing's concepts and his writing towards the invention of digital computation.

Bodies in Relation to Rhetoric

The passive bodies that feminist scholars have identified are also found in some rhetorical theory. However, instead of truth or knowledge transcending or controlling bodies as we see in philosophy, rhetoric and language transcend and control bodies. For instance, we see this when Michelle Ballif (*Seduction, Sophistry, and the Woman with the Rhetorical Figure* 25) and Diane Davis (*Breaking Up* 40) both define bodies as passive and even non-existent before the constructing power of language and rhetoric. Gail Corning and Randi Patterson define bodies as sites of inscription and construction at intersection of "persuasion, discourse, and power" (9). These definitions define bodies as passive objects that are constructed through active language. This gives rhetoric a transcendent, productive role over bodies. By first defining bodies as objects and language as active powerful processes, rhetoricians are then able to theorize rhetoric without accounting for the bodies that live and breathe in each rhetorical situation.

Since at least the 1990s, the emerging field of body rhetorics argues that bodies have been marginalized from contemporary scholarship. These scholars cite a perceived

absence of bodies as the exigency for more detailed research that focuses on bodies. (e.g. Corbeill, *Nature Embodied: Gesture in Ancient Rome*; Crowley “Body Studies in Rhetoric and Composition”; McKerrow, “Corporeality and Cultural Rhetoric: A site for Rhetoric's Future,” Jack Selzer and Sharon Crowley, eds. *Rhetorical Bodies*, Barbara A. Biesecker, John Louis Lucaites, *Rhetoric, Materiality, and Politics*). For example, in their edited collection *Rhetorical Bodies*, Sharon Crowley and Jack Selzer argue that the linguistic turn focused so narrowly on language that bodies were either excluded entirely or were included as inert, passive matter constructed by all-powerful language.

In response to this perceived absence, rhetoricians have moved to include bodies more fully and actively into our theories of discourse and persuasion. Debra Hawhee argues that we must include bodies in rhetoric in order to address the vast diversity of rhetoric we encounter in our day-to-day lives (“Bodies, Rhetoric, and Everyday Life”). In her analysis of Burke’s life and writing, she describes language and bodies in a tight, interacting relationship, in which bodies and language both have some influence or power over the other (*Moving Bodies*). This relationship between bodies and language can also be seen in Burke’s theory of consubstantiality from *A Rhetoric of Motives*. Burke introduces this term that joins two distinct, even opposed parties by focusing on shared interests or commonalities (20-21). Consubstantiality is a way of “acting together” (21) between bodies and discourse. For Burke, bodies and language are never identical; however, they are always intersecting and interacting.

In the related field of Composition studies, Kristie Fleckenstein (*Embodied Literacies*), Sondra Perl (*Felt Sense*) and Peter Elbow (*Vernacular Eloquence*) all argue,

in different ways, that composition has failed to utilize a writer's body to improve writing. They all offer different solutions for bringing bodies into composition more fully. For instance, Peter Elbow argues that, if we speak aloud while writing, then our ear and ingrained sense for language will aid in compositing clear, simple, eloquent writing.

While I acknowledge that the common claim in body rhetorics—that bodies have been excluded—is valid regarding much of rhetorical theory, reading generously into the history of rhetoric reveals a rich tradition of discourse on bodies. Since at least as far back as the ancient Greeks, bodies have played important roles in rhetoric. The sophists held the belief that the universe is a connected interacting whole, wherein everything is material, including language (Kerferd 72). With this understanding of the universe, sophists theorized rhetoric as a material or bodily method of creating change. Gorgias demonstrates this theory of language when he wrote that words worked like strong body seducing Helen of Troy (“*Encomium of Helen*”). In part, this can be read as a metaphor. However, Gorgias also believed that words have the power act on bodies by recreating sensory experience (Enos 132-3)—which his *Encomium* does by physically demonstrating it! Long after the sophists, even Aristotle accounted for the different kinds of bodies—young, strong, or old—of potential audiences, although somewhat rationalistically (*On Rhetoric* 165-9). A key figure in Roman rhetoric, Cicero understood oratory as working on intuition in much the same way that music works on bodies to make us move (Katz).

Within modern rhetorical theory, bodies play active roles in some of the most significant texts. The 18th century saw renewed interest in elocution and chironomia,

which were two forms of pedagogy that taught orators to train their bodies' gestures, postures, pronunciation, and vocal performance in order to maximize persuasive impact. (Austin, *Chironomia*; Bulwer, *Chirologia*). The work of Kenneth Burke contains extended discussions of bodies acting rhetorically (*Permanence and Change*; see Hawhee, *Moving Bodies*). James Berlin's social-epistemic rhetoric shifts the focus of rhetorical theory towards the historical and material contexts of text and shifts the focus of pedagogy towards understanding our experiences as texts to be read. The focus on historical context refocuses on specific bodies within specific material contexts. In addition, focusing on experiences as texts refocuses on our bodily experiences (e.g., emotions, reactions, movements, and senses of security or insecurity) and how rhetoric shapes our actions, beliefs and identities. In race rhetoric, Keith Gilyard's scholarship studies how race functions in dominant discourse to prescribe limited or even dehumanizing identities to black bodies while white bodies define the norm (*Race, Rhetoric and Composition*). Feminist rhetorics also have called attention to gender and the role of women in rhetoric's history (e.g., Jarrett, *Rereading the Sophists*; Glen, *Rhetoric Retold*). Feminist scholars have also theorized rhetorics race, laughter, and silence and listening rhetoric, which all include some consideration of bodies (e.g. hooks *Talking Back*; Davis, *Breaking Up [at] Totality: A Rhetoric of Laughter*; Glen, *Unspoken*). George Lakoff and Mark Johnson also account for how our bodies participate in rhetoric by drawing from recent findings in cognitive science (*Philosophy of the Flesh*). They explain that our brains use metaphor to understand abstract concepts by relating them to concrete, bodily experiences.

I move through these texts quickly to emphasize that there is no deficiency of discourse on bodies in recent rhetorical theory. If Burke compared scholarly discourse to entering a parlor with a heated conversation already in progress (*Philosophy of Literary Form*, 110-111), the parlor in which rhetoricians discuss bodies is quite a crowded party. Not only do we have *a body* in rhetorics, we have a lot of *different bodies* doing different things. In the above review of literature, I have emphasized the inseparability of discourse and bodies by focusing on the many intersections between the two in the history of rhetoric. The intersections between discourse and bodies demonstrated in this quick literature review are significant for this dissertation because they set the stage for the chiasmic relation between bodies and discourse. Rhetoric and bodies seem to be inseparable.

The Mutual Threat of Bodies and Rhetoric

This intersecting treatment of bodies and rhetoric is not coincidental: both represent challenges to universal truth, reason, and logic. If an observed truth is to achieve the status of universality, then that truth must be true for all bodies, at all times, in any language, and potentially in any rhetorical arrangement. Rhetoric and bodies both challenge claims to universal truth because both call attention to the particular physical and discursive context in which truths are constructed, composed, and communicated. Therein lies the threat that philosophers since Plato have warned against: both bodies and rhetoric remind us that knowledge is from some body and understood through some rhetorical strategies and within established discursive codes.

Instead of universal truths and transcendent knowledge, bodies and rhetoric compose knowledge and even truths that are limited the specificity of unique situations, stylistic choices, singular bodies, and our particular life experiences. All of these particularities shape how we communicate. In addition, the particularities of our bodily and rhetorical forms, in this case Turing's bodily particularity and rhetorical particularity, construct how we interpret, understand, and value knowledge and meanings. Our bodies shape what we know about the world, our ethics, and political values. In addition, language and rhetorical choices shape how we understand the world. Language and bodies are both forms that interact to construct the lenses through which we understand our lives, our world, and our values.

Chiasmus and Embodiment

The chiasmic relation between bodies and discourse, which we will investigate in and through Turing's writing, is by no means new or unique. Maurice Merleau-Ponty set a precedent for thinking of bodies as chiasmic figures. In "The Intertwining—the Chiasm," Merleau-Ponty introduces the term chiasm to explain the crisscrossing, intertwining interactions among vision and touch—and by extension objectivity and subjectivity. Merleau-Ponty begins with the experience of touch and touching in which the subjective experience of touching is also the objective touch of the other. Chiasmic experience and material reality reverse and intertwine to connect subjectivity and objectivity. Merleau-Ponty then extends this intersection so that vision relates to the connection between

external, social, and cultural experience while touch relates to internal, personal, and individual experiences.

By arguing that flesh and world intertwine through sight and touch, Merleau-Ponty concludes that subjective knowledge is always intertwining with objective knowledge. Merleau-Ponty describes these intertwining experiences in wave-like, intertwining terms: “Through this crisscrossing within it of the touching and the tangible, its [the hand] own movements incorporate themselves into the universe they interrogate, are recorded on the same map as it; the systems are applied upon one another, as the two halves of an orange” (133). The subjective experience of any human is always connected and, as Merleau-Ponty writes, “recorded on the same map” as objective reality. This conclusion refuses to deny objectivity. Merleau-Ponty is not a solipsist nor is he an empiricist. Instead, intertwining flesh and the world assumes that any knowledge is at the same time both objective and subjective.

Working with Merleau-Ponty’s notion of chiasm, Judith Butler further develops the definition of bodies as chiasmic figures. In particular, the rhetorical figure chiasmus becomes the model for understanding the relation between bodies and language. Butler defines chiasm as “the rhetorical figure...that two different relations are asserted which are not altogether commutative” in which “there is a formal symmetry in the figure of the chiasm, there is no semantic equivalence between the two phrases symmetrically so paired” (“Sexual Difference as a Question of Ethics” 75). Butler sees this figure as powerful. The meaning between the two sides of chiasmus, like the relation between language and bodies, always exceeds each other. Although there is formal balance, they

both produce surplus. In *Bodies That Matter*, she describes the relation between bodies and language as “chiasmic in their interdependency, but never fully collapsed into one another” (69).

Although she never explicitly uses the word chiasmus, Elizabeth Grosz’s theories also imply chiasmic relations. In particular, Grosz describes the interactions of material and culture as a Mobius strip. This shape of the Mobius strip is initially a chiasmus in so far as it is made of two parts that intersect in the center (36). However, this figure adds a further layer of complexity to the chiasmus. First, the two intersecting lines are not two separate lines. Rather, they are folded over to connect at both ends. This is a single connected strip that is twisted into an X. This means that the two lines not only intersect, they also curve around and back into the other side. Second, this twisted strip, in order to create the X, must also have a twist on each side at which point the inside become outside and outside becomes inside. We find similarly complex, intersecting relations defining the rhetorical figure of chiasmus.

Chiasmus and Form

Chiasmus, although defined in a variety of ways, always creates an intersecting formal balance between two different clauses, phrases, sentences, or larger sections of text. The figure is composed of two intersecting, always connected, but never collapsible parts. For instance, we have Francis Bacon’s chiasmus “If a man will begin with certainties, he shall end in doubts; but if he will be content to begin with doubts he shall end in certainties” (in Quinn 94). The figure is made of two lines that intersect. The meanings of

these two phrases intersect, but they also diverge so that the meanings are opposed. The intersecting parts of the chiasmus simultaneously suggest difference and inseparability. Likewise, bodies are composed of different yet inseparable parts—both body and language—as I will analyze in the case of Turing. Bodies and Language neither collapsible into a larger whole nor are the distinct parts totally separable or totally distinct from the interacting parts. The relation between the two is so close that we cannot understand bodies without language, and we cannot construct meaning without our skin to sense, our hands to write, and our mouths to speak. The relation between these two parts is also equal; language does not supersede or override bodies, nor do bodies determine or control language.

Chiasmus has been defined inconsistently at times as a trope, other times as a schema, and at times as both. The differences between tropes and schemas are significant because they parallel the antithetical relation set up between knowledge and bodies. Schema means the shape or the form of language. This is the structure, sound, and the space that words take up on pages. Edward P.J. Corbett, for example, defines scheme as a “deviation from the ordinary pattern or arrangement of words” (425-6). Trope is defined as “a deviation from the ordinary and principal signification of a word” (426). Tropes are figures of concepts and content. Because tropes figure concepts or content, they are often given more attention and value as important ways that humans communicate. Fahnestock writes that it is especially the trope of metaphor that has received extensive scholarly attentions (4-6). Schemas, however, have had an uphill battle. As Fahnestock explains,

schemas are often defined as ornamental, non-essential, even excessive or distracting (17; cf. Lyotard).

This distinction between schemas and tropes parallels the distinctions between knowledge and rhetoric, mind and body, and message and media (see McLuhan). In each of these distinctions, philosophy and science have traditionally privileged the abstract first term as separate, and perhaps more pure or true, than the material or structural. Just as mind has been privileged over bodies, and ideas or knowledge cherished without regard to the media, so to tropes have been privileged as epistemic—or keys to understanding and knowledge—while schemas have been seen as unessential, structural, and instrumental for communicating, understanding, or constructing knowledge. When Francis Bacon, in *The Advancement of Learning*, rails against rhetoric as a frivolous and decorative practice, he is writing against rhetoric as an ornament of words. Even Henry Peacham's 1577 treatise on rhetorical forms, which is ostensibly a celebration of rhetorical forms, still compares them to the flora and fauna that decorate the garden of eloquence (in Espy).

This diminished or unessential role for the schema, however, is by no means uncontested. The later shift to privilege ideas as independent of formal structures, according to Fahnestock, is another negative consequence of the “fatal dissociation” between content and form (58). Jeanne Fahnestock argues that schemas form the *epitome* of scientific argument. She also argues that Aristotle, Cicero and Quintilian make no distinction between tropes and schemas, because, in some ways, these fathers of rhetoric

understood form in a tight, complex relationship with content. Form and content are inseparable; moreover, they both inform and dynamically co-construct each other.

Chiasmus forms the primary figure of my rhetorical thinking in this dissertation. In addition, I have composed the dissertation as an initial iteration of a performance of chiasmic movements that create multiple points of intersection between bodies and rhetoric. I have done this primarily by intersecting and connecting biographical details from Turing's life, feminist theories of bodies, technical history of digital computation, as well as detailed study of the rhetorical figure chiasmus. By cutting together these different discourses, this dissertation creates intersections and interactions between Turing's body, theories of bodies, technology, and rhetoric. In composing the form of this dissertation, I was also committed to writing in a narrative, performative style. This is not exclusively a stylistic choice. Just as rhetorical figures construct knowledge, so too, my use of narrative shapes the knowledge of this text by adding energy, movement, and the particularity of Turing's story. Narratives and stories, as theorized by Adrianna Cavarero, anchor theory in specific human body (*Relating Narratives*). This style is central to Cavarero's philosophy, as she argues that bodies have long been erased from philosophy and political theory (*For More Than One Voice*). To counter-act this centuries-long trend, Cavarero uses narrative and storytelling as her philosophical method. The result is that her texts live and breathe with lively bodies on every page that give depth and complexity to her ontological and political thought. Likewise, I use Turing's narrative to drive the argument and the form of this dissertation.

Chapter Overview

Each chapter gradually develops a notion of chiasmic rhetoric by considering increasingly more complex movements of chiasmic figuring. As these chiasmic relations become more active, so too does my discussion offer complex analyses of Turing's embodiment and how that embodiment relates to his developments of digital computation and artificial intelligence. In Chapter Two I begin by discussing antithesis, which is related to but simpler than chiasmus. I argue that antithesis is the primary figure that has been used to represent the relations between bodies and knowledge in philosophy and demonstrate how Alan Turing reforms long established antithetical relations between bodies and mind in his young writing in the 1932 essay/letter "Nature of Spirit." To demonstrate that we need a more complex figure to understand the relations between bodies and knowledge, I enroll feminist critiques of mind-body dualism into a close reading of Turing's style to find locations in the text where antithesis breaks down.

Having established the added complexity of the relations between bodies and knowledge, I turn to chiasmus for the remainder of the dissertation. In Chapter Three I develop the most extended discussion of chiasmus. This chapter functions as the center point of the dissertation and creates a grounding for understanding chiasmus between bodies and discourses. In that chapter, chiasmus moves to connect or intersect two things. From this movement to connect, I will build the remainder of the dissertation into more and more dynamic and even unstable notions of chiasmus between bodies and discourse. In Chapter Three, I use the detailed scholarship on chiasmus from the historical, literary, rhetorical, and stylistic perspectives to argue that Alan Turing's thinking and invention

are fully integrated and intersecting with embodiment, even in his most theoretical and most abstract 1936 article “On Computable Numbers with an Application to the Entscheidungsproblem” that proved that mathematics would always have some mysteries and unsolvable problems. To get to this conclusion, Turing had to first start with the embodied process of solving calculations. With this argument, I therefore further develop a notion of chiasmic rhetoric in Alan Turing’s writing in which bodies and discourse co-constitute knowledge.

In Chapters Four and Five I develop chiasmic rhetoric through increasingly complex notions of embodiment and relate these Turing’s own embodied experiences. In Chapter Four, I argue that chiasmus moves towards dynamic relations between the two intersecting parts of bodies and discourse. In this case, Turing’s body and his writing on artificial intelligence in “Intelligent Machinery” (1948) dynamically intersect in so far as the disciplining and regulating that Turing experienced on his own body were reinscribed onto the computer’s body. In Chapter Four, I also integrate theories of sexuality, especially by Foucault, in order to call attention to the many rigorous ways that the intellectual training that Turing benefited from constitute a form of bodily training that compose him as a subject with sexual subject outside of heteronormative standards.

In Chapter Five I pay close attention not only to embodiment of Turing and of the computer, but also to bodily differences. Chiasmic rhetoric, here, moves towards becoming a destabilizing force. In particular, this chapter looks at the gendering discourses of Turing’s world and also in Turing’s text. I analyze Turing’s most famous text “Computing Machinery and Intelligence,” to argue that Turing’s chiasmic rhetoric

destabilizes the relations between bodies and discourse. Here, I find that the relations are destabilizing because Turing not only embodies his machine in particular ways but also genders the machine and the machine's technicians as feminine. This specific feminizing calls attention to the bodily differences that are re-inscribed when Turing begins with bodily experiences in order to produce knowledge of artificial intelligence.

Finally, in Chapter Six, I conclude with a discussion of how the notions of chiasmic rhetoric that I have articulated in this dissertation generate critical and productive methods of teaching writing, especially the teaching of technical writing. Given that all writing is embodied writing, I argue that the writing of science and technology has more work to do to acknowledge and account for the particular embodied context of its production and also the embodied effects. It is with the movements of chiasmic rhetoric that I am able to demonstrate the progressively complex, integrated, dynamic, and even destabilizing relations between Turing's embodiment and his technical writing. And chiasmic rhetoric has important implications for teachers of technical writing. In addition, it is through the movements of chiasmus that I demonstrate the many significant ways that Turing's knowledge production and his inventiveness composed through his embodiment. This suggests that we must pay attention to the unique bodies composed between material and cultural construction in the classroom, and how we might do this.

CHIASMUS 2:

PRODUCING ANTITHESIS THEN BREAKING ANTITHESIS



*“I think that spirit is really eternally connected with matter
but certainly not always by the same kind of body.”*

~Turing, “Nature of Spirit”

“A perennial motif that underlies much of scientific creativity—names, the urge to fathom the secrets of nature...we will fathom the ultimate secrets of own mortality.”

~Keller, *From Secrets of life to Secrets of Death*

Before Alan Turing invented the digital computer and cracked the codes produced by the Nazi Enigma Machine, he was just a boy experimenting with friends, with relationships, with gnats in jars, and telescopes pointed to the skies. He was also a boy who received rigorous disciplining to conform to standards of British decorum. Through this disciplining and also through his study of biology, physics, and logic, Turing learned that a good body was disciplined, clean, and controlled. In this chapter, I will draw

connections between young Turing's experiences and his early thinking on the relations between mind and body. I will identify these connections between his life and ideas through a close analysis of his essay/personal letter, titled "Nature of Spirit."

In "Nature of Spirit," as I will demonstrate, Alan Turing defines bodies in opposition to spirit or free will. "Nature of Spirit" reproduces the well-entrenched religious, scientific and philosophical relation of antitheses between bodies and mind. Antithesis is a rhetorical figure that defines two things as opposed or mutually exclusive. Traditionally, Western philosophy and science have reified a relation of antithesis in which bodies are outside or opposed to knowledge, truth, and reason. After defining antithesis, I will draw from feminist critiques of philosophy in order to trace the historical significances of antithesis between knowledge and embodiment. Feminist philosophers demonstrate that, while antithesis between body and knowledge may be rhetorically maintained, in fact, there are many levels of connection between knowledge and the particular historical, social, political, and embodied context, out of which knowledge emerges. This chapter is organized in the form of antithesis: it is composed of two parts that are opposed. I will first demonstrate how antithesis structures Turing's essay, and then I will turn to demonstrate the ways that the article cannot not maintain mutually exclusive antithesis. In the second half of this chapter, I perform a close style analysis of Turing's essay in order to locate places in the argument, structure, and style where antithesis breaks down: places where mutual exclusivity between mind and body are not maintained.

Turing's Education

Alan Turing and Christopher Morcom met at the prestigious Sherborne School when they were both teenagers. Alan didn't fit in at the school, which seemed to be more concerned with teaching manliness, manners, and decorum than science and math. By 'didn't fit in,' I don't just mean he wasn't one of the cool kids, which he certainly was not. He didn't seem to fit in with any of the students. For 2 years, he had few or no friends. Although many of his professors agreed that Alan was unusually bright, even the adults teased Turing because of his appearance, which was often disorderly or even dirty, and his

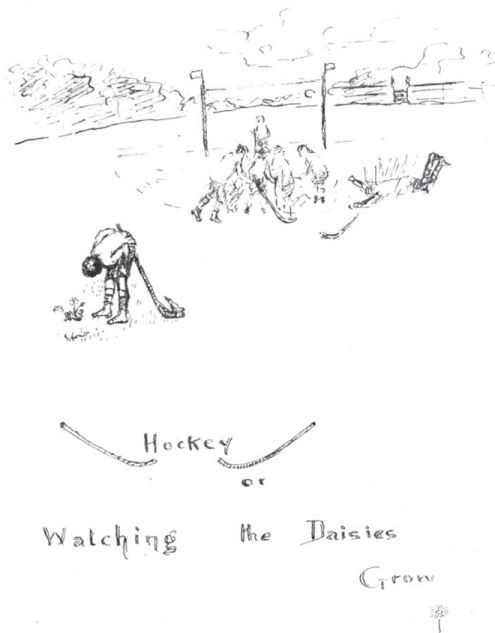


Figure 1 "Watching the Daisies Grow" Drawing by Mrs. Turing, which she sent to the matron at Turing's elementary school in the spring of 1923.

mannerisms, which were quiet and dreamy. He seemed unable to use a pen without getting ink all over his hands. On the sports field, he appeared to be day dreaming more than participating in a competitive event (Hodges 11). His mother sketched the image to the left when Alan Turing was just 8 years old, which would surely have embarrassed almost any young boy (Leavitt 11).

For an upper-class, young man at the beginning of the 20th century England, what seem to be peculiar habits to my 21st century sensibilities were more than embarrassing social *faux pas*. Alan's peculiarity represented a major impediment to graduation from Sherborne and threatened his access to elite British society. Although everyone knew he

was unusually bright, his parents continually received bad reports based on his bad handwriting, messiness, disordered dress, and general inability to conform to the social norms (Hodges 25).

Into this context, Christopher Morcom entered Alan Turing's life. Turing was 16 and Morcom was 17. These young men became friends. Morcom and Turing were also deeply intellectually engaged. Their letters back and forth discuss the details of their experiments and methods. They wrote about how to find particular asteroids and what constellations they had seen through their telescopes. Together they discussed chemistry, physics, math. At a place like Sherborne, where the sports were far more important than experiments and abstract mathematics, Turing was starved for companionship as well as intellectual stimulation. Morcom's friendship fed Turing personally and intellectually.

This context is important in order to understand the importance of this friendship on Alan Turing. Morcom was not just *a* friend. He was Turing's first close friend. In addition, he was the first to really engage with Turing in a way that allowed Turing to thrive as an intellectual young man with particular interests in science and math. This was an important turning point in Turing's life. Morcom was more popular. With this companionship, Turing began to make more friends. He was enjoying his school experience and striving to succeed socially and academically, in large part, to impress Christopher (Hodges 42-43).

Several biographers describe Morcom as Turing's "first love," even Turing's first lover. David Leavitt describes their relationship as one that "blossomed along the classic trajectory of nineteenth-century "romantic friendship," marked by flurries of rhapsodic

emotion” (16). But “classic trajectory of nineteenth-century “romantic friendship”” is somewhat ambiguous. We know that Turing was open and even confident about his sexuality within his small group of close friends. Leavitt even calls Turing “naïve, absent-minded, and oblivious” for being so open about his sexuality (4). We know relatively little about Turing and Morcom’s relationship. We know from his letters that Alan was attracted to Christopher at first sight. Like many teenage loves, Alan felt that Christopher “made everyone else seem so ordinary” (in Hodges 35). The most extensive biographer on Turing, Andrew Hodges, writes that the romantic attraction was one-sided, but that their friendship was genuine and even affectionate (44).

These studious, even nerdy, young men made plans to enroll in the same college, King’s College at Cambridge University. They made plans to continue their research. They wrote letters about comet sightings (Hodges 45). After two years of friendship, on February 6th 1930, Christopher was rushed to the hospital in London. Less than a week later Christopher died of tuberculosis. Turing was not told that Christopher was ailing until after he passed away.

Alan Turing’s “Nature of Spirit”

Two years later, Alan traveled to visit Christopher’s mother at her home, which is called the Clock House in Bromsgrove. This was not Alan’s first visit with Mrs. Morcom, who was an artistic, free-spirited woman. They became friends after Christopher died. Turing joined the Morcom family for vacations and for day-trips to Mrs. Morcom’s London flat.

During this particular visit in 1932—in the house where Christopher spent his childhood, experimented in the lab, gazed at the stars—Alan wrote a short essay “Nature of Spirit.”

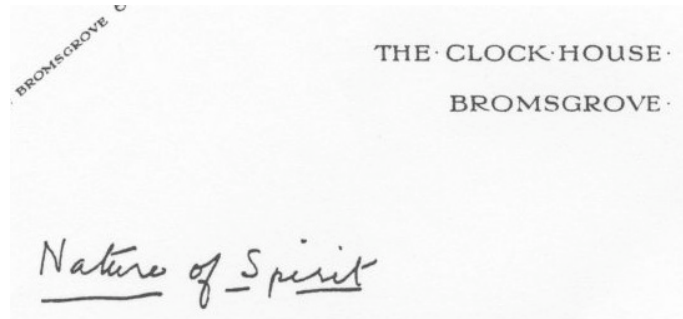


Figure 2: “Nature of Spirit” Letter Head from the Clock House

This 6-page, hand-written essay has been read as a seed pot out of which grew the theories that made possible the invention of modern computers and digital computation (Hodges 67; Copeland 30; Leavitt 102). In some ways, the essay seems to conform to the conventions of scholarly writing. He cites two opposed positions that many students of science at the time would have been familiar with, which are material determinism and emerging theories in quantum mechanics. In particular, he offers his summary on these two differing schools of thought on the relation between bodies and human freewill. Turing quickly summarizes his interest in these two fields and then clearly places his stake along with those who defend human free will and controlling mind over matter.

However, the essay breaks the conventions of scientific writing more than it conforms. In no way is this essay an example of scientific research or scientific writing. This is a note, the personal musings of a young man who has a deep interest in science. Turing does not attempt to conform to the structure of scientific writing. Gross identifies the dominant structure of articles in scientific journals: Introduction, Methods, Results, and Discussion (IMRaD). As will be discussed more in Chapter 3, even Turing’s

published technical articles do not conform to this typical form. He is a young man interested in science. Most of his letters to friends and family included detailed descriptions of the books he read, experiments he performed, and theories he was developing. Even as a boy, he wrote to his mother about experiments with flies and drew sketches of less-than-successful invention. Like many of these letters, “Nature of Spirit” discusses his thoughts on scientific matters, but he is not attempting to formulate a viable argument. Nor does he attempt to conform to the expectations of a scientific audience, which of course was in no way his target audience. Rather, this is a sensitive, caring note of hope from a grieving boy to the grieving mother of Christopher Morcom. “Nature of Spirit” connects science and spirituality. Turing discusses his former belief in a heavenly afterlife and the possibility for a person’s spirit to live on beyond the death of a person’s body. And all of these spiritual, even mystical, claims are made in the context of scientific justification.

Although Turing posits claims about both materialism and spirituality, he offers no evidence or support for his claims. He engages with scientific theory but does not quote directly or even explain in any detail. Although he is positioning his claims between two different scientific theories, he writes his own position in the style of personal musing. For instance, he writes, “personally, I think” and “I cannot guess what happens.” These word choices suggest a low level of certainty, or rather, no certainty³. In this essay, Turing does not attempt to make empirical claims in this essay. He writes about spirits and alternative universes. Some words are placed in scare quotes, which

³ In Latour and Woolgar’s classification of statements of fact in scientific writing, this would be statement type 1: speculations that convey the lowest certainty (79).

suggest that Turing himself didn't quite accept his use of words like "spirit." These scare quotes are ways for Turing to distance himself from the words "spirit" and "mechanical" (see Wysocki and Lynch 575). The physical essay reveals Turing's messy handwriting, scratched out words, extra smudges and blobs of ink that dropped on the page as his hand moved from the inkwell to the page. In its form, claims, and even its physical appearance, this little essay is a personal, early musing of a young scientific mind thinking about a very personal topic.

If we consider the context in which Turing penned this essay, then the purpose of the essay appears to be less to establish his position on contemporary scientific theory and more to think through his dear hope that Christopher Morcom's spirit may live on, even though this is never stated explicitly. This short essay was obviously not intended for publication or any professional audience. The one and only intended reader was Christopher Morcom's mother. Turing wrote the essay while visiting her at the home where his friend grew up. Early in the day, Turing walked around the grounds that Christopher explored as a young man. Christopher's mother wished Alan good night as they all retired for the night. Turing wrote the essay in Morcom's room. He slept in Christopher's bed. After all this, on stationary with "The Clock House" letterhead, Turing wrote "Nature of Spirit" hypothesizing that spirits may live on in alternative bodies. On the 3rd page, Turing pens the word "but when the body does the 'mechanism' of the body, holding the spirit is gone and the spirit finds a new body sooner or later perhaps immediately [sic]" (qtd in Hodges 64).

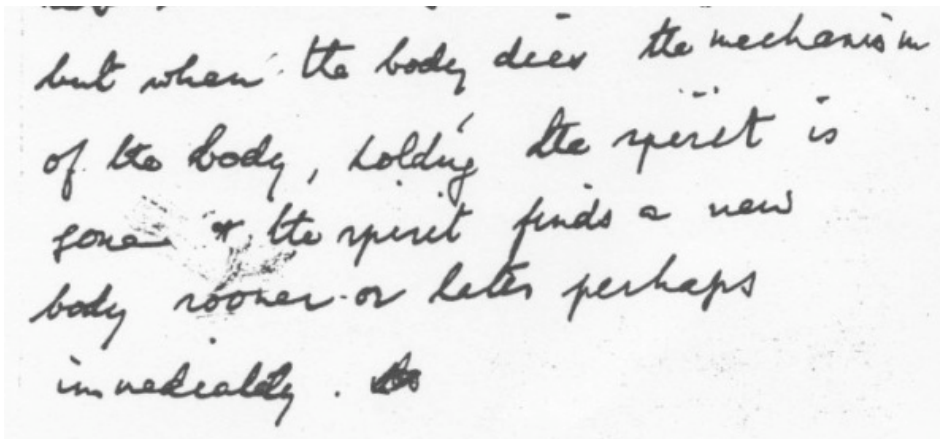


Figure 3: "Nature of Spirit" sample of Turing's handwriting.

Although Christopher's body may have died, his spirit may have lived on to inhabit other kinds of bodies. This hypothesis and hope that his friend's spirit may still live on becomes an initial entry point for understanding the relations between bodies and spirits that Turing held at this time.

Defining Bodies in "Nature of Spirit"

The primary question of "Nature of Spirit" addresses the relationship between bodies and spirits. Turing specifically uses the word spirit, but I will also relate this spirit to notions of mind or consciousness. I make this association in part because Turing seems uncertain about this term: he uses quotes whenever he uses spirit. In addition, the theories that he is citing of are not theories of spirits in the religious sense. Rather, they are theories of the relation between material and human consciousness or free will.

The significance of this essay is not in its scientific or theoretical soundness. Rather, the significance is in the fact that the essay lays the groundwork for understanding how Turing defines the relation between bodies and minds. Turing's

answer is not because it is unique. Rather, his answer re-inscribes an age-old relation of antithesis between bodies and minds through scientific speculation.

Turing begins by dismissing a notion that “if everything was known about the Universe at any particular moment, then we can predict what it will be through all the future” (qtd. in Hodges 64). This position, which is a material determinist position, would allow no room for human will but would instead hold that matter predetermines all activity in the Universe. Hodges explains that this would have been a familiar concept for any student of science or math. For any problem, if sufficiently detailed information were provided, then the entire future of the physical system could be determined (Hodges 64). These material determinist theories would include astronomy, which Turing mentions specifically in “Nature of Spirit.” In addition, many mathematicians espoused a kind of material determinism. In 1900, David Hilbert, the prominent mathematician, posed the Entscheidungsproblem, or the problem of decidability that asked if mathematics was a completely ‘decidable’ science. Until 1936, Hilbert and the majority of prominent mathematicians concluded that every mathematical question could be solved given comprehensive data and precise terms. This conclusion would be undermined in 1936 with the publication of Turing’s first major contribution to mathematics “On Computable Numbers, with an Application to the Entscheidungsproblem,” which will be the focus of Chapter 3.

Turing dismisses material determinism in favor of human will that is able to “determine the actions of the other atoms of the universe” (qtd in Hodges 64). Turing counters this material determinist argument by citing the theories of quantum mechanics,

which studies the physics of atoms and the smallest scale of matter. Turing was interested in new quantum mechanics because, at the very small scale of atoms and particles, “it seemed that certain phenomena were absolutely undetermined” (Hodges 65). Quantum mechanics has shown that random, unpredictable phenomena proliferate at the atomic level and cannot be explained through material observation (see Heisenberg’s uncertainty principle which he first published in 1927). Turing was working directly with Arthur S. Eddington’s in *The Nature of the Physical World*, which argues that the random phenomena observed in quantum mechanics are not random at all but rather the effects of human will or intuition. Hodges describes this book as an “olive branch that Eddington held out from the throne of science towards the claims of religion” (64). Eddington draws from Heisenberg’s Uncertainty Principles, which draws on quantum mechanics to “check the findings” of philosophies, including Descartes’ notion of an independent mind with free will. John McTaggart’s *Nature of Existence*, published in 1921, extended the olive branch that Eddington held out from science to religion. According to McTaggart, the relationship between bodies and spirit is such that “matter is meaningless in the absence of spirit” (qtd in Hodges 64). McTaggart drew loosely from quantum mechanics to justify notions of reincarnation. According to McTaggart, a human mind (which Turing would call spirit) amplifies through matter beyond a single body (66). As a teenager, Turing believed in a Christian notion of heaven. He imagined that spirits could live without bodies. He rejects Christianity by the time he enters college. However, his beliefs in spirits do not stray far from Christian notions of souls and heaven.

While Turing expresses his conviction that spirit and bodies are connected, this connection is not a relation between two equal parts. In “Nature of Spirit,” Turing expresses his belief that “as regards the actual connection between spirit and body I consider that the body by reason of being a living body can ‘attract’ and hold on to a ‘spirit’, whilst the body is alive and awake the two are firmly connected” (qtd. in Hodges 64). While spirit and body are connected, spirit determines and gives meaning. Matter is meaningless and lifeless. Matter dies and decays. Spirit is not bound to this same sad state. Instead, “I think,” Turing contemplates, “that spirit is really eternally connected with matter but certainly not always by the same kind of body” (qtd in Hodges 64). When the body dies, spirits can live on in another kind of body. While spirit is particular, unique, and eternal, any kind of mortal body can passively hold onto spirit without changing the nature or character of the spirit. The work of McTaggart gave Turing more the scientific justification to imagine spirits inhabiting new bodies rather than residing in a heavenly place. It is unclear what kind of body Turing may have imagined Christopher’s spirit inhabiting. Hodges imagines that Turing may have hoped that “the Clock House still held the spirit of Christopher Morcom” (63). Hodges then asks “Could the atoms of Alan’s brain be excited by a non-material ‘spirit’, like the wireless set resonating to a signal from the unseen world?” (63). Years later, after many years of intellectual development, Turing will again suggest that some of the functions of human minds can be performed by new bodies. But this time the new bodies will be mechanical. In order to better understand the relation between bodies and minds that Turing posits I

will next review the significance of antithesis as a rhetorical figure and as a relation between bodies and minds in philosophy.

Form and Rhetoric of Antithesis

In “Nature of Spirit,” Turing presumes that the relation between bodies and matter is one of antithesis. Antithesis is a rhetorical figure that includes two parallel phrases, ideas, or things and defines the relationship between the two things as opposed, contrary, or essentially different. Turing’s use of antithesis within scientific writing is not unusual. In *Rhetorical Figures in Science*, Jeanne Fahnestock finds antithesis as a crucial figure in many foundational texts of scientific writing, including Francis Bacon's *Advancement of Learning* (59) and Darwin's *The Expression of Emotions in Man and Animals* (65). This is also the figure that cements the difference between male and female as an antithetical, contrary relationship (Fahnestock 81-85). Richard Lanham, in *Analyzing Prose*, suggests that antithesis may be ingrained into our biology: “as a habit of mind, antithesis may well be intrinsic to how we think, part of the brain's now-familiar right and left hemispherically” (122). He finds antithesis in every aspect of life from the animal's body language (122) to the very “patterns of thinking” that also frame the structures of formal logic (125).

In modern definitions of antithesis, many scholars continue to privilege antithesis as a more meaningful trope over any schema of form. When the form of antithesis is included, it is incidental or unessential for the effective use of antithesis. For instance, in *A Handlist of Rhetorical Terms*, Richard Lanham defines the figure as the act of

“conjoining contrasting ideas” (12) and mentions no formal qualities. Edward P.J. Corbett defines the figure in terms of either a figure of words and ideas or as a figure of ideas independent of form. His primary definition is that antithesis is “the juxtaposition of contrasting ideas, often in parallel structure”(464). Arthur Quinn defines antithesis as a figure that both affirms one thing and to deny/negate its opposite (67-8). He makes no mention of a specific formal structure, and of his examples do not follow into any particular form or structure.

In his more in-depth research on rhetorical figures *Analyzing Prose*, Lanham's discussion of antithesis brings the figure back to its formal schema. For Lanham, figures are like maps: they trace out in space the relations between things (119). These formal structures then become ingrained in our thinking as tacit knowledge: we understand the concept in part because we recognize the form. Antithesis gets its rhetorical force from its formal structure, which is recognized and understood by the reader. The form itself creates antithesis. However, Lanham's is a flexible schema. Lanham defines antithesis as a form with parallel wording. According to Lanham, the ‘sense’ of antithesis must be created, but that sense can appear in a variety of forms. Throughout his discussion, Lanham analyzes a variety of figures, in a variety of grammatical structures that all work to create antithesis in both concept and form. Sometimes these are parallel; sometimes they are out of balance. Other times these are equal, or not equal. The importance is placed on figures that “both frame thinking and, by their formal ‘logic’ of sight and sound, urge certain thoughts upon us” (125).

Although other scholars define antithesis as enacted in content alone, Fahnestock maintains a formally strict definition and demonstrates this in each of her examples. In addition, she defines a more specific structure for antithesis. In particular, the formal structure of the antithesis is “defined as a verbal structure that places contrasted or opposed terms in parallel or balanced cola or phrases” (46). Fahnestock draws this from Aristotle's *Topics*, which defines antithesis as both contrary ideas and also as a formal structure (51-52). She also explains that the *Rhetorica ad Alexandrum* as well the notion of antithesis in Quintilian and Cicero’s writings understand antithesis to be a figure that is both contrary or opposed ideas as well as a formal or stylistic device (55).

Relations of Antithesis

Antithesis, like many rhetorical figures, constructs specific relationships between two things. According to Fahnestock, antithesis can create new oppositions where there were none. It can use established oppositions in order to frame new arguments. In addition, antithesis can be used in more subtle ways to define or reconfigure the relationship between established opposites (58). This point is important because a number of different kinds of antithetical relationships are possible through this rhetorical figure. Antithesis can create a cut, essentially slicing two concepts of things into definitional opposites. This is a contrary relation (Corbett 129-131). This is like the cut between definitions of man and woman or masculine and feminine. The terms are defined through their mutual exclusion of the other. The relations between mind and body are most often contrary relations of mutual exclusivity where no middle ground is possible. But the opposition

does not have to be mutually exclusive. The antithesis could be that of scale (large or small, good or bad) or kind (cat or dog) (Corbett 59).

The effect in all forms of antithesis, according to Lanham, is that the relations appear inevitable. The tacit logic of the figure works so that “the second half of the assertion seems to follow inevitably from the first because the shape of the phrasing says so” (Lanham, *Analyzing Prose*, 124), which creates the “path of least resistance” (136). In addition, the figure of antithesis creates either/or logic where no middle ground is possible. This, Lanham asserts, creates “mutually exclusive roles. It excludes, *by its form*, the temptation to stand in the middle” (123). In addition, this figure lends itself toward false dilemma or either/or fallacy. This is a common logical error in which only two options are considered while alternatives or middle ground are excluded.

Antithesis can be understood in terms of *topoi*, or common places for starting arguments. Edward P. J. Corbett defines three *topoi* that also forms of antithesis: contraries, contradiction, and difference (129-31). These three classifications are part of his common topics for inventing arguments, which he draws heavily from Aristotle’s *Topics*. Contraries and contradictions are closely related terms. Both set up mutually exclusive relationships. However, contrary sets up a relation where one term is defined as “opposite or incompatible things of the same kind” (hot vs. cold) (129), while contradiction sets up a relation where one term is defined as the negation of the other term (hot vs. not hot) (131). This difference is subtle but important for the purposes of argumentation. Contrary defines the relations between things as opposites where both terms are defined in opposition to the other. For instance, in the contrary between hot and

cold, their opposition defines both terms. However, with contradiction, the relations are defined by one term as the negative or absence of the other. For instance, in the contradiction between hot and not hot, the second term only has meaning in so far as its lack, or absence of heat.

In the third class of antithesis, difference compares ideas or things through a more flexible and complex relation. In this comparison of difference, the things or ideas do not have to be of the same kind or species, for instance cats and dogs. These things are different, but they are not defined as opposed. In addition, relations of difference may share some qualities. For instance, cats and dogs are both mammals. An author could compare these different things without constructing an opposition. Rather, difference creates an antithesis where the two concepts overlap in some ways and diverge in others. This relation of difference is significant because antithesis does not have to construct a relation of mutual exclusivity. The topoi of difference allow the antithetical ideas or things to be defined through their dissimilarity while, at the same time, sharing some similarity or commonality. This is not the relation that Turing constructs in “Nature of Spirit.” However, as this chapter progresses I will demonstrate ways in which the strict mutual exclusivity of contrary cannot be maintained. Although I do not argue that Turing creates a relation of difference in this article, through a reading of his style and form, I will locate connections and mutual inclusivity between bodies and mind. Before I make that shift, I will next identify contrary antithesis as significant rhetorical form in Alan Turing’s essay “Nature of Spirit.”

Identifying Antithesis in “Nature of Spirit”

Alan Turing builds his argument for spirit as transcendent of bodies on the topoi or common ground of contrary antithesis between bodies and minds. Antithesis works most obviously on the level of content in Turing’s “Nature of Spirit.” The two terms are mutually exclusive. Both are defined in opposition to the other: what is spirit is not body and what is body is not spirit. This antithesis can best be described as a contrary because the figure defines the relationship between bodies and spirit like two sides of the same coin: the definition of bodies becomes the opposite of spirits and the definition of spirits becomes the opposite of bodies. However, unlike contradiction, for Turing bodies are not defined as the negative or the absence of spirit. In fact, Turing writes: “but when the body dies the “mechanisms” of the body, holding the spirit is gone & the spirit finds a new body sooner or later perhaps immediately” (qtd in Hodges 64).

I identify this relation as contrary because, for each quality that defines spirits, bodies are associated with the opposed quality. For instance, spirits are defined as unique and freed from lived experience while bodies are defined as general forms that are bound by material constraints. Bodies die. Bodies also need sleep. Death and sleep are not experiences of the spirit. In addition, Turing writes, “matter is meaningless in the absence of spirit” (qtd in Hodges 64). So bodies are meaningless, but spirits are meaning-giving. He writes that bodies “hold on to” spirits while alive. Another key term Turing uses is “mechanisms,” which he puts in scare quotes. This word choice suggests a notion of bodies as mechanical, programmed, automatic. Earlier in the essay Turing writes that bodies serve to “amplify” the working of spirits. Again, this word choice works

metaphorically. Here bodies are like speakers or amplifiers that help to project the sound (content/data) of a person or recording. Spirit is active and meaningful. The matter of bodies is instrumental and serves to aid but not contribute or change the content of the spirit. This suggests a definition of bodies that are passive content, form with no content. Spirits, on the other hand, are defined as active content of a person, identity that is indifferent to form. In all of these qualities, the qualities of spirit are contrary to the qualities of bodies.

By drawing upon the antithesis between bodies and spirit, Turing is drawing from a common place of arguments. The antithetical relationship is not a new concept that Turing introduces or extends. Instead, this antithesis would have been an accepted notion. As Fahnestock explains, antithesis builds a new argument based on accepted notions of antithesis. Corbett classifies contrary and contradictions as common topics. These common topics are to be used to generate or discover new arguments. In order to develop a new argument, Turing started with the common topic of an antithetical relation between bodies and spirits that his audience would have readily accepted. But what then, if not a new relation, was Turing trying to argue? In this essay, Turing works from antithesis between bodies and spirits in order to posit a new argument that perhaps spirits can continue to live in a number of different kinds of bodies.

Antithesis can also be found in the macro organization of the essay. The organization is in the form of antithesis in so far as the position posited in the opening is first refuted and then the contrary position is established in the final paragraph. In the first paragraph, Turing introduces a notion of biological determinism, which is exactly the

notion that he seeks to reject. He writes, “it used to be supposed in Science that if everything was known about the Universe at any particular moment then we can predict what it will be through all the future” (qtd in Hodges 64). The second paragraph moves to a notion where spirits are the key meaning-givers, but they are also eternally connected to bodies: “As McTaggart shews [sic] matter is meaningless in the absence of spirit...Personally I think that spirit is really eternally connected with matter but certainly not always the same kind of body” (qtd in Hodges 64). Then, in the final two short paragraphs, Turing considers how spirits may move from body to body as our material existence ages and dies. He questions, “why we have bodies at all; why we do not or cannot live free as spirits and communicate as such?” (qtd in Hodges 64). This structure creates antithesis between biological determinism, which he rejects, for the alternative of all-determining spirit with passive bodies. This antithetical structure pivots on the claim that bodies and spirits are eternally connected but not always to the same body. This antithesis form creates a sense that there are only two alternatives, as Richard Lanham explains, that are mutually exclusive: matter is either all determining or spirit is all determining. No middle ground is possible. In addition, the antithesis structure transitions so that the notion of biological determinism is negated through the move to affirm spirit.

Finally, how may we see antithesis on the formal level, the sight and sound of the sentence? Fahnestock defines as antithesis as a schema of parallel phrases connecting opposed idea. To begin, nowhere in Turing’s essay do we find a schema of antithesis as defined by Fahnestock. But this does not mean that we cannot find the sense of antithesis, as described by Lanham, in the formal structure Turing’s writing. First, many of the

sentences bodies and spirits alternate between the subject and the object. For instance, Turing writes, “the body by reason of being a living body can ‘attract’ and hold on to a ‘spirit’ ... spirit finds a new body sooner or later... The body provides something for the spirit to look after and use” (qtd in Hodges 64). In each of these cases, bodies and spirits are separated into the subject and object. As Corbett explains, contrary antithesis creates a relation where, in this case, bodies and spirits are mutually exclusive (129-131). In the form of Turing’s essay, that separation can even be found on the level of the sentence by separating the terms into either the subject or the predicate. This separation creates a visible and structural divide between bodies and spirits. In addition, bodies and spirits are associated with different kinds of actions. Bodies “can ‘attract’ and hold.” “The body provides something for the spirit to look after and use.” These verbs—‘can attract and hold’ and ‘provides’—put bodies in an instrumental or useful role. Bodies provide resources. Bodies hold and attract. The actions that bodies perform are in the service of something else, and that something else, for Turing, is spirit. Meanwhile “spirit finds a new body.” Spirits *communicate*; they *do* things and they *use* bodies. In these cases, spirit has the will to find, use, and look after bodies. Spirits act on the basis of will. Bodies are passive resources that hold and amplify the will of spirits.

Purpose of Body and Mind Antitheses

This relation that I’ve described above is far from unique. This can be found in volumes and volumes of philosophical and scientific theory. As Hodges points out, “Alan could have found many of these ideas in his reading of Eddington while still at [Sherborne]

school” (64). Arthur Eddington wrote *The Nature of the Physical World*, which Turing had been reading since he first arrived at Sherborne. Eddington was a Quaker who sought scientific justification for his religious beliefs. His book explicitly explains the human body as a kind of machine. This machine of our bodies facilitates the working of human free will.

This notion of bodies and spirits that both Eddington and Turing presume can be found throughout the history of philosophy and rhetoric. This contrary antithesis has been a common place for defining not only bodies, but also for defining what kinds of knowledge is valued in philosophy and science. This tradition assumes that bodies are passive and meaningless without mind or spirit. Likewise, Alan Turing writes of bodies that are meaningless, mechanistic, and passive; this is the result of long-standing discursive codes that defines bodies as opposed to knowledge. Out of this context, it is no wonder that Alan Turing could envision a way for his friend Christopher’s active, wise spirit to transcend and overcome the death of a passive bodily container. Turing clearly indicates that any body will suffice. He writes, “spirit’s really eternally connected with matter but not always by the same kind of body.” And that when a particular body dies “spirit finds a new body sooner or later.” In other words, the particularity of a human’s body is irrelevant. Spirits need to live or reside in bodies, but spirit can move from body to body. Equipped with this antithetical relationship between bodies and minds, Turing will later invent a thinking machine. However, later we will find that bodies in Turing’s text play a more complex and even active role in their relation to thinking and mind.

Movements of Antithesis

Lanham uses an active, physical metaphor to explain the rhetorical work of antithesis.

Antithesis performs a rhetorical Judo: “by keeping the phrase but inverting its meaning we use our opponent's own power to overcome him” (122). Antithesis sets up contraries



Figure 4: Olympic pictogram of Judo

but only in order to throw one under the dominance of the other. In the practice of Judo, as with antithesis, the superior athlete may not be stronger. No... it is trickier than that. The dominating athlete uses the forms and techniques of Judo to turn strength of the opponent into the opponent’s own downfall. The image to the left is a

pictogram of a Judo match. The two opponents meet in the middle. They touch. The body of one seems to meld indistinguishable into the body of the other. This figure looks deceptively like a caring or sharing embrace. However, at the heart of this connection we have antithesis and opposition. The two meet, touch, balance into each other only to try to master. Brut strength will not win this opposition. If one opponent were to throw in all of his strength, then he would lose his balance. Once balance is lost, the match is over. The superior opponent knows how to match strength while maintaining balance. By maintaining that balance, the superior opponent can turn the power of her opponent into the crucial move to dominate the lesser opponent.

Fahnestock writes that antithesis is most complete when the figure is set in two parallel and balanced phrases (46). By setting up the figure in a balanced structure, antithesis gives a sense of evenness and completeness. Just as with the body and mind

antithesis, the two are set up as two poles out of which the world can be divided neatly and cleanly between the two. This appearance of balance, according to Lanham, also gives a sense of naturalness or inevitability (*Analyzing Prose* 125). Fahnestock may agree with this claim as she writes that antithesis is strongest when the readers already buy into the opposed relation (58). When readers come across this balanced yet oppositional figure, it appears to contain everything, both the negative and the affirmative. Both sides of the coin are visible by connecting the antithesis. The writer appears to be revealing all: the light and the dark, the heads and the tails, statement and counterstatement.

However, by setting up a figure that claims to show both sides, the figure creates a logical fallacy of false opposition. The figure may tell the reader that it shows everything, both light and dark; however, all shades of grey and all color are hidden in the figure. By dividing the opposition into two balanced, seemingly complete opposed pairs, antithesis hides more than it reveals. Antithesis hides the grey areas between the two opposites. The contrary relations of antithesis also hide how the two things or ideas may create relations of sharing and co-construction rather. This is especially true for contrary and contradiction. Only difference is a relation that allows for opposition while at the same time preserving complex connections and similarity.

Antithesis also appears to be natural or inevitable, as if there is no other way to understand the relation between the two opposites. As Fahnestock argues, this figure “exploits the existence of many “natural” opposites in the vocabularies of languages” (Fahnestock 47). In the case of body-mind dualism, the figure of antithesis does not simply set up balance between the two: bodies and minds are the two parts that make up

our world. More specifically, if the figure of antithesis sets up these opponents so that one is clearly poised to dominate the other, then the figure sets up from the start a relation where minds are the dominating, constructing opponent.

This relation of contrary antithesis is obvious in Turing's essay. Bodies are associated with passive, instrumental verbs. At the same time, spirit is associated actions that are willful, productive, and meaning-giving. By setting up this balance that divides the world into passive bodies and active minds, the figure of antithesis creates a sense of natural, inevitable opposition. Everything associated with bodies appears naturally opposed to minds. Women, nature, emotions, sex, bodily desires: all of these fall neatly and naturally as opposed to minds, knowledge production, and agency. In the figure of antithesis, the split appears natural and inevitable.

Feminist Critique of Antithesis

When feminists identify and critique the contrary relation between bodies and knowledge, their insights are meaningful to women because the critique identifies the means through which women have been systemically excluded from the very definition of reason, logic, and knowledge. And the significance goes beyond this important contribution. This feminist critique matters because they reveals what men have to gain, or what men seek to gain, by defining bodies in opposition to reason. Men gain a means to elevate the knowledge they produce to the level of universal, eternal, objective truth. This gives their knowledge a power of indisputable truth. In addition, by creating universal truths that transcend bodies, this knowledge has a power over bodies and a

power over and beyond our human lives. When we break down the antithesis between bodies and knowledge, we can begin to see the rich, productive, and politically significant ways in which bodies inform our knowledge production. We also begin to break down the grip of universal truth in favor of particular, contextually contingent knowledge.

Even at a young age, Alan Turing learned to discipline his body in order to communicate. In particular, as will become a theme throughout his life, Alan Turing invented technological means of controlling his body so that he can ‘properly’ develop as a student. For example, young Alan Turing had terrible handwriting. As Hodges explains, young Turing’s handwriting problems “plagued him” (14). In fact, adult Alan Turing had pretty messy writing. As a child, he couldn’t seem to write without getting ink all over his hands, little arms, and his writing table. This was a serious problem. At the elite Sherborne School, students were evaluated more on their ability to conform to standards of decorum than they were on their course work. Likewise, the neatness and orderliness of his writing and physical appearance was evaluated as much, or even more, than the content of his writing. At a young age, Alan Turing learned that controlling and training his body was a prerequisite for educated young men.

Turing's first and second inventions, at the age of 11, were writing machines. On April Fool's Day, 1923, Turing describes his first invention to his mother: "Guess what I am writing with. It is an invention of my own it is a fountain pen... you see to fill it scweeze E and let go and the ink is sucked up and it is full [sic]" (ctd Hodges 14). This squiggly line sketch does not appear to represent a particularly promising solution to this

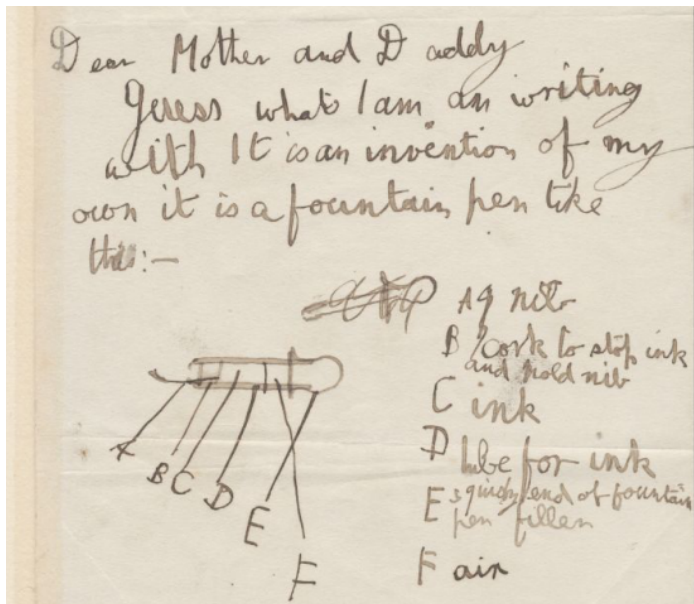


Figure 5: Letter to Mother and Father with Diagram of Fountain Pen. 1929.

problem. Apparently this new device was intended to slowly control the ink to avoid smearing onto his arms, shirts, and tables. This particular letter, which was written using his pen, does not necessarily demonstrate better handwriting. A couple of months later, he

wrote about his second invention: a typewriter with

“funny little rounds” for letters that press against ink. By this time he gave up on legible handwriting in favor of mechanical writing. Turing needed to discipline his body in order to progress as a student. At this time in his life, his body was the problem. He solved that problem through these childhood inventions, through these technologies.

Young Turing sought to train his body in order to conform to the standards of an educated young man. These can be seen as small, literal manifestations of what Foucault

would identify in his lectures on governmentality as “technologies of the self.” However, for Foucault, these technologies of the self are much larger than any literal technology. Technologies of the self refer to a broad set of practices, laws, conventions, and discourses that individuals practice in order to represent, and even constitute, themselves as subjects. Chapter 4 addresses the interactions and co-constructions between bodies and writing (a mode of technology of the self) and will engage with Foucault’s concepts in detail. For now, I raise this concept in order to call attention to this small example, of which many more will be discussed in Chapter 4, in which technology is used to discipline Turing’s body. This literal controlling bodies through technologies of the self is a specific instantiation of a larger epistemological necessity to control bodies for the sake of knowledge production.

Controlling Bodies

Adrianna Cavarero explains that controlling bodies and managing bodies is of vital importance: it is only through controlling or excluding bodies that claims of universal truth can be posited. Cavarero explains that Plato first defined philosophy as the pursuit of true forms and as antithetical from bodily life. For Plato, philosophy is most like mathematics⁴. This connection would have been especially meaningful for Plato because logos can also mean numbers (Cavarero 152-3). Associating philosophy and Truth with numbers and mathematics was a much more appealing option than associating Truth with

⁴ Toulmin and Goodfield suggest that Plato’s theory of matter, which explains all matter in terms of quantifiable, geometric shape, and volume, would also reduce all physical science to mathematics (75-82).

bodies and speakers. Bodies and speakers are all different. They change over time. They live in concrete reality. The particularity of a concrete body or context informs the truth produced. For Plato, Truth and true forms must be free of the instability of material reality. True forms must be timeless, invariable, and therefore abstract. Numbers are not necessarily connected to material reality. One can think of numbers, count, solve problems, without ever associating those numbers with physical things. In addition, the relation between numbers is always stable. The value of $3 + 2$ is always the same no matter what is being counted. As Plato associates truth with numbers (a kind of logos) and distances truth from speech (another kind of logos), truth comes to be understood as abstract, disembodied, and universal. Again, this separation allows philosophers to maintain an illusion of universal truths that are independent from the particularity of the speaker.

This split allows for a tradition of philosophy that promises to construct Universal Truth. This must have been so very empowering to those who ‘discover’ truths. Their ideas were not particular, contextual ideas that may have begun and ended with the life of the person. Instead, they were discovering timeless truth. They were articulating truths that existed for all time, for all men, in any place. This form of knowledge—the knowledge that can never and will never change—was the premium for philosophers.

While Cavarero argues that the body-mind dualism offers the promise of eternal truths, in the antithesis titled *Secrets of Life, Secrets of Death*, Evelyn Fox Keller argues that, for scientists, this split may offer the hope of transcending human mortality. This hope is “a perennial motif that underlies much of scientific creativity” (39). Science is

driven by “the urge to fathom the secrets of nature, and the collateral hope that, in fathoming the secrets of nature, we will fathom the ultimate secrets (and hence gain control) of our own mortality” (*Secrets of Life, Secrets of Death* 39). Keller argues that, within scientific discourse, the divide between man and nature, a divide that leaves women on the side of nature, is a longstanding and well-entrenched figure of antithesis that divides the knowledge of men and science is separate from the secrets of nature, life, and women. Women and the natural world have been conceptualized as those who can nurture and birth new life and hence as mysteries that need to be understood, controlled, and replicated. This work suggests an implicit hope that knowledge will lead to addressing man’s oldest problem: death. While biology has historically been a science of endless mysteries and iteration, Keller identifies a new rhetorical strategy within molecular biology and genetics that mimics or parallels the rhetoric of physics and math. For the first time, Keller argues, biology appeals to the ethos and logic of physics and math: biology became a science with the codes that could unlock all mysteries. Once biology could unlock the mysteries of life, then the scientists may eventually control life and also death.

Controlling Turing’s Body

In many ways, Turing was a product and beneficiary of this long-standing antithesis between body and mind. Turing was trained to strive for this premium, universal truth. He studied Bertrand Russell’s *The Principles of Mathematics*, which outlines the abstract logical foundations that cement mathematics as an objective and rational science (Hodges

90-91). J. David Bolter calls the Turing machine the “embodiment” of formal logic. “In the computer,” Bolter explains, “symbolic logic has achieved what it could not achieve in the cryptic pages of Russell’s *Principia*; it has become the foundation of computerized mathematics” (71). Turing was familiar with Gottfried Wilhelm von Leibniz’ efforts in the 16th century to create a mathematical code to precisely calculate and evaluate all of human knowledge (Leavitt 28-30 and Bolter 73). When studying the relationship between mathematics and “ordinary life” with Ludwig Wittgenstein, Turing disagreed with the philosopher by insisting that a strictly formal logic and code could be developed to calculate knowledge, including what Wittgenstein called “common sense” (Leavitt 146-147). Through his education and his research, Turing learned that premium knowledge was abstract, transcendent truths. These logical foundations of his work are only possible by taking great efforts to abstract knowledge from any particular body, any particular historical time, and even any particular linguistic construction, which the antithesis of body and mind makes possible.

In addition, Turing was also very explicitly pursuing the secret of life and the potential to master death. Keller’s research specifically applies to biology and genetics, but her same claims can be extended to understand Turing’s essay. By defining mind in a contrary relation with bodies, Turing can first imagine human life in alternative bodies and then will go on in his career to suggest that a kind of intelligence may exist in mechanical bodies. In this early article, Turing pursues scientific explanations for imagining life after death. Toward the end of his life, Turing will explicitly develop the

connections between biology, code, and the control of life in his work on morphogenesis, which is the study of cell growth and development.

Those who seek Universal Truths and eternal life are not the only ones to benefit from the antithesis between body and mind. Susan Bordo explains that even post-structuralist philosophers, known for their rejection of foundations and universal truth, also work out of a notion of body and mind antithesis. In particular, postmodern notions of free play, in many ways, depend on abstracting knowledge from particular bodies. Bordo recognizes that post-modern theorists effectively challenge the “view-from-outside” that is idealized in much of philosophy and science. However, in its place, post-modern theorists have offered a view-from-everywhere. Bordo writes, “the spirit of epistemological *jouissance* suggested by the images of cyborg, trickster, and the metaphors of dance, and so forth obscure the located, limited, inescapably partial, and always personally invested nature of human “story making” (228). Postmodern play may not claim to have unbiased access to stable knowledge. However, it does claim a kind of transcendent form of knowledge construction. This free-play of ideas and words transcends the situated and grounded of particular physical contexts.

Instead of this “epistemological *jouissance*,” Bordo asks for a humble attempt at epistemology, which she calls a view-from-somewhere (145). This view-from-somewhere is always limited and informed by our particular bodies and contexts. Similarly, Cheryl Glenn associates her feminist historiography with resistant postmodernism. Unlike what she calls ludic postmodernism, which is play without any established location, Glenn explains that her feminist histories of rhetoric resist narratives

of *The* history of rhetoric and instead asks “*Whose* history? *Whose* rhetoric? *Which* rhetoric?” (5). Answering these questions require scholars to account for the unique, relational embodied experiences and how our embodied experiences shape how we produce knowledge, what knowledge we produce, and the rhetoric we compose.

Although Turing’s rhetoric suggests a transcendent view of knowledge and mind, as I continue to develop the chiasmic rhetoric that connects bodies and discourse, so too, Turing’s rhetoric will appear in a particular social, historical, and embodied context that informs his rhetoric and the knowledge he produces.

Losing Antithesis in “Nature of Spirit”

I’ve demonstrated how antithesis appears both in the concept as well as the form of Turing’s short essay. I’ve also demonstrated how, through its history in Western philosophy and science, the antithesis between bodies and minds has been reified over and over again. And, with each new iteration, this antithesis allows for notions of stable, transcendent truth as well as an prerequisite of managing and controlling bodies and an underlying patriarchy that excludes women (or those associated with the category feminine) from intellectual as well as political engagement. But this choice between mind and body is a false alternative. This is based on a shared assumption the relation between bodies and mind is a figure of contrary antithesis. Antithesis between body and mind allows for notions like Turing’s that transcendence from bodies is not only desirable it is also potentially possible. However, even in Turing’s writing, the contrary relation

between body and mind begins to blur. These are places where the mutual exclusivity of bodies and minds is impossible to maintain.

While Turing clearly does reify the antithesis between bodies and minds, in the argument and the form of “Nature of Spirit,” the contrary antithesis between bodies and minds begins to break down. Turing’s body and life intertwine with his writing and thinking in a variety of different ways. One of these ways that body and mind antithesis breaks down lies in the fact that Turing was motivated to write “Nature of Spirit” out of a desire to be reunited with his friend Christopher Morcom. Beyond that, in the style and syntactical level of this essay, Turing’s writing figures bodies and spirits with some connections and relations.

The most obvious location where the body mind antithesis in this essay breaks down or begins to blur is in his frequent use of ‘I.’ He writes, “Personally, I think that spirit is really eternally connected with matter. I did believe it possible for a spirit at death to go to a universe entirely separate from our own, but now I consider that matter and spirit are so connected...” An ‘I’ can never map cleanly onto one side or another of the body mind-dualism. This personal pronoun refers to Turing himself. This writer must necessarily connect both body and mind, even if this is simply on the level that a body is required for writing to occur. ‘I’ refers to Turing as a person. This includes his thinking, but this thinking does not come out of nowhere. Instead, this thinking, in this text in particular, is highly influenced by Turing’s personal experiences, his emotions, his desires, and his feelings of pain and loss. This ‘I’ does not develop these ideas out of nowhere. Instead, this ‘I’ draws these ideas directly from his research, his education, and

also his upbringing as a Christian. In addition, this ‘I’ connects the text to Turing as a body. He wrote this by hand. His body sat in Christopher Morcom’s room, with a pen in his hand, and a lamp so that he could see. By writing ‘I,’ Turing affirms that a person with a body, mind, history, education, culture, and language put a pen to paper to articulate these concepts.

In addition, Turing’s use of ‘I’ is prominent. He uses ‘I’ to own all of his claims and ideas. Instead of stating his claims about the relation between bodies and spirits as objective facts, Turing places himself at the center of this essay. In the first paragraph, in which Turing is reviewing established literature, he does not use any ‘I’s. However, as soon as he turns to articulate his understanding of the ostensibly antithetical relation between bodies and spirit, he uses ‘I’ in all but 2 sentences. By structuring each sentence so that the ‘owning’ subject is the author himself, Turing calls attention again and again to source of this knowledge. He makes no attempt to posit objective claims about reality. He does not objectively describe the relation between body and spirit as if he were describing certain, concrete facts about reality. Instead, he places himself as the active subject of each sentence. The claims he develops can only be read by first remembering that a particular British, young, well-to-do, white, gay, male person has developed and owned these ideas.

From Antithesis towards a New Figure

In so many ways, the figure of antithesis is insufficient for conveying the relation between bodies and minds. The figure creates a black and white opposition where we

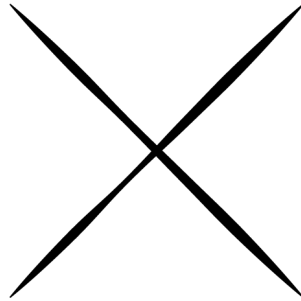
need to find more shades of grey. The figure appears to be balanced and complete, but its use for the body/mind dualism has continually given mind the dominant role and body the subordinate. The relationship between bodies and minds is far more complex than antithesis allows. For instance, antithesis cannot explain Turing's inventive thinking that, although committed to abstract logic, was also surprisingly concrete.

In the following chapters, I will develop how chiasmus is a rhetorical figure that more fully accounts for the complex relations and interactions between our bodies, our writing, and our knowledges. This figure is necessary to understand the interactions between bodies/knowledge and writing/idea. Antithesis and chiasmus are related but distinct rhetorical figures. Fahnestock includes antithesis between the two phrases as one possible aspect of chiasmus (128-9). Lanham describes chiasmus as a larger, umbrella category under which antithesis can be included (122). While these figures are related, antithesis and chiasmus construct very different relationships between their parts. Both rhetorical figures structure kinds of relations between things, ideas, or phrases. Like chiasmus, antithesis creates parallel relation between the two parts. In addition, like chiasmus, antithesis creates a tension or a dissonance between the parts. However, unlike chiasmus, the relation created in antithesis is creates a linear, even teleological relation between the parts. The figure chiasmus creates a more complex relation between the parts of the figure of speech as well as a more complex relation between bodies and language. Chiasmus allows for difference and complex locations of similarity. Whereas antithesis between body and mind constructed a mutually exclusive relation, chiasmus potentially

creates a co-constructing, dynamic, and productive relation between bodies and discourses that produce knowledge.

Four years after penning “Nature of Spirit,” Turing published his groundbreaking essay “On Computable Numbers, with an Application to the Entscheidungsproblem.” The importance of this essay cannot be underestimated; this article lays the logical foundation for digital computation as well as applies that logical foundation into a surprisingly simple solution to a long disputed mathematical question. Because of its importance, mathematicians and computer scientists have studied it again and again. However, we know nothing about his process of developing these ideas. He kept no notes. He published no preliminary research. He had not even given lectures in which we may be able to find traces of his early development of these ideas. How did he develop these innovative concepts? This was the question that his research assistant asked Turing decades later. While laying in a sheep pasture, on a lovely summer day, Turing watched the clouds pass by. And he figured it out (Hodges 105). There in the grass, Turing figured out how to invent the universal computing machine. This process of invention cannot be explained through an antithesis of mind and body. A more complex intersection of body and mind was at play on that sunny summer day.

CHIASMUS 3:
INTERSECTING BODIES AND DISCOURSES



“Chiasmic in their interdependency, but never fully collapsed into one another”

*~Butler, *Bodies that Matter**

“The behavior of the computer at any moment is determined by the symbols which he is observing, and his “state of mind at that moment”

~ Turing “On Computable Numbers”

In the previous chapter, I demonstrated the ways that Turing’s early writing reinscribed an antithesis between bodies and minds. However, I also demonstrated the various stylistic and formal ways in which a hard antithesis of mutual exclusivity broke down to reveal locations of blurring and intersection. In this chapter I will draw on scholars of both rhetoric and gender theory in order to posit the first move towards chiasmic rhetoric: this is a move to intersect bodies and discourse. This chiasmic rhetoric at the intersections of bodies and discourses will help me to demonstrate the many ways that Turing’s

knowledge is produced in tight connection with embodied experiences. Bodies are present in Turing's technical writing in "On Computable Numbers, with an Application to the Entscheidungsproblem." In addition, bodies are central for his theoretical contributions and breakthroughs in digital computation. This chapter, therefore, challenges some common ways of understanding digital technology as disembodied. This gives bodies more significant roles in science and technology studies because bodies are the starting place for solving abstract theoretical problems and for inventing digital computation.

After providing the disciplinary and social context in which Turing wrote "On Computable Numbers," I will review the definition and theories of chiasmus in rhetorical theory. Then, I'll relate the rhetorical properties of chiasmus to the notions of chiasmic bodies in feminist texts. I will also demonstrate how these chiasmic relations break many of the objective conventions of rhetoric of science. Finally, I'll analyze Turing's texts, looking for places where bodies take space and intersect in ways that are productive for knowledge production.

In the four years between writing "Nature of Spirit" and the publication of "On Computable Numbers, with an Application to the Entscheidungsproblem" little changed in Turing's daily life. Most of his days seem filled with thoughtful quiet stereotypes of what the "life of the mind" looks like: He lived alone. He worked alone. He ran alone. At Kings College in Cambridge faculty and students dined together, which were Turing's most regular social interactions. He also went out to pubs with friends, saw plays, and generally enjoyed a quiet but rich personal and professional life. Throughout this time

during and after his undergraduate studies, his life occupied many of the same offices, seminar rooms, streets, and labs. He engaged with many of the same friends and advisors day after day, year after year. He graduated in 1934 but earned a fellowship that allowed him to continue to live in Cambridge. He rowed every morning in college. After graduating he ran every morning. His friend group remained largely the same: small, all-male, intellectual group of close friends. He never successfully entered the most prominent echelon on Cambridge society. Nor did he seem to try. His other friends joined social clubs. Turing never did. Perhaps, as Andrew Hodges suggests, this reservation to move from the margins to the center of elite society was a protection (78).

Although homosexual acts were illegal and widely stigmatized in British society generally, Hodges argues that King's College was a unique place. Turing's sexuality seems to have been common knowledge among his peer-group at Kings. David Leavitt describes the culture at Kings as "an ideal environment for intellectual and erotic experimentation, encouraging dissent while protecting the incipient dissident from the sort of violent counter-reaction that his ideas and behavior might have provoked in a more public forum" (23). Hodges and Leavitt make these claims based in large part to the presence of other prominent, open gay intellectuals, including E. M. Forester, who lived on the same street as Turing, and the theoretical mathematician G. H. Hardy.

"Homosexuality, in private," Agar writes, "was a key part of the college culture" (69). And Agar goes on to describe the school as "a rare oasis, sympathetic both socially and intellectually" (69). Kings had a reputation for teaching students to question the status quo. As such, the school also had a "gay reputation," according to Leavitt, that was open

to discussion and practice of alternative sexualities (18). Within Turing's friend group, sex, pleasure, bodies, and desires were openly discussed as lived realities and subjects of psychoanalytic and theoretical inquiry. In the letters between Turing and his friends, young men all suggest that the boys who attend elite public schools like Sherborn were comfortable and knowledgeable about same-sex attraction and affection. Hodges suggests that Cambridge was perhaps the one place where Turing could develop personally, intellectually, and socially as a "complete, consistent whole" (78). Kings was a safe place for Turing. "He simply accepted it," Leavitt concludes but "assumed (wrongly) that others would as well" (19). Within this space, Turing built a good life. He also began building a name for himself as a mathematician and logician.

Defining Chiasmus

Chiasmus is a bit trickier to define than antithesis. Antithesis has been defined and named relatively consistently throughout the history of rhetoric, but chiasmus has had an inconsistent role in the history of rhetorical figures (Fahnestock 131). To be sure, chiasmus as a figure can be found in very ancient text and has been identified as a critical figure for ancient Hebrew writers (Lund). However, within handbooks and studies of rhetorical figures, chiasmus is somewhat obscured because its primary qualities can be found in different ways within many different rhetorical figures. Chiasmus doesn't make its debut until Cicero's *Rhetorica Ad Herennium*, several centuries after the first handbook of rhetorical forms. Even when chiasmus does appear as a rhetorical form, it is named inconsistently, but the same general features are included. Cicero names this

figure *commutatio* one of the many related forms of chiasmus, which “occurs when two discrepant thoughts are so expressed by transposition that the latter follows from the former although contradictory to it” (Cicero 325). Both Lanham and Fahnestock think of chiasmus as a genus figure, under which several species of figures derive. Epanados, antimetobole, hysteron proteron, commutatio, permutatio, palindrome⁵: these are all different positions of the same root figure. For scholars of rhetoric, looking for the X that marks the spot identifies chiasmus and its relatives. Chiasmus is composed of two (or more) connected phrases, which may be contrary, contradictory, differing or complimentary. The first phrase of the figure is inverted or reversed in the second phrase. “Ask not what your country can do for you but what you can do for your country.” This creates a mirror image between the first and the second phrase.

Form of Chiasmus

Fahnestock identifies the chiasmic figure antimetobole in the most formally specific way (123-5). This figure must have two balanced phrases connected into a single sentence. In addition, at least two of the terms in the first phrase must be repeated in the second. This is the easiest variation to find because of the repetition of terms as well as reversed repetition of the grammatical structure. However, most of the definitions of chiasmus allow for great flexibility in the wording and structure. Fahnestock writes that chiasmus

⁵ Epanados is an inverse repetition on the level of the phrase (Quinn 93). Antimetobole or commutatio is an epanados that also includes antithesis between the two phrases (Quinn 93). Hysteron proteron means a phrase reverses the temporal sequence (Quinn 43). Permutatio is a change with a repetition (Lanham, *A Handlist* 76). Palindrome is a chiasmus in letters that make up a word or phrase (Quinn 93).

can use synonyms or grammatical variations in the second phrase. This means that the same basic X structure is preserved, Fahnestock allows for some variation of wording (124). Richard Lanham, predictably more flexible, defines chiasmus only by the grammatical structure (122-3). The words in both of the first and the second phrase correspond, but the correspondence could be that of synonym, similar parts of speech, similar sounds, same first letter, parallel ideas, or contrary ideas. The only specific requirement for Lanham is that chiasmus is a formal structure composed of two parts, which could be phrases, sentences, or whole sections of books, and those parts must reflect or reverse in some way. Quinn defines chiasmus figure as epanados, which is “organizing spatially around a center” (95). Mardy Grothe, author of a book entirely filled with examples of chiasmus, *Never let a fool Kiss You or a Kiss Fool You*, even find chiasmus when the first half of the phrase is absent. He calls this an implied chiasmus. We find it whenever a popular saying or quote is exactly reversed in order to give the popular phrase a different meaning. For example, “time wounds all heels” (115). Grothe, who is ever excited about chiasmus writes, “the fun of implied chiasmus is dual first you have the pleasure of figuring out what's been reversed; then you get to marvel over the ingenuity behind these inspired chiastic creating” (114).

The size of chiasmus ranges from whole books, as is found commonly in biblical chiasmus and hysteron proteron⁶ to very small forms like the palindrome. Palindrome is a

⁶ Quinn defines hysteron-proteron as another kind of chiasmus. It means to reverse the chronological order. To put the horse before the cart, as Quinn puts it (43). In Greek, it means “the latter [put as] the former” (*Lanham Handlist* 58). The etymology of this word is the same as hysterics, which means traveling womb. When something (in this case time) moves about where it should not, to create an unsettled effect.

one-word chiasmus. They can be read from front to back and back to front. My favorite palindrome is “taco cat,” which now a widely popular with its own Internet memes, video loops, websites, and merchandise. The tiny palindrome is the chiasmus that takes the least amount of space. It is also likely the hardest to identify. From whole books to the word “dad,” chiasmus can be expansive or diminutive. The same formal X structure applies.

Chiasmus is a crucial figure in biblical studies, most famously by Nils Lund in *Chiasmus in the New Testament*. The sheer volumes of texts on chiasmus in biblical texts serves as evidence of the established prominence of chiasmus as a central rhetorical figure in biblical rhetoric (see review in Man’s “the Value of Chiasm for New Testament Interpretation”). For instance, Ronald Man argues that chiasmus functions as so much more than an ornament. Chiasmus functions in biblical texts as “a means toward more effective communication of their messages. In the case of chiasmus, this is accomplished by underlining the central emphasis or clarifying correspondences in the text” (154). But, scholars of biblical texts most often define the figure with an addition of a central focal point. This includes a third element: central point or pivot point. Fahnestock calls this an additional element that “populates the center” (126). This formal structure looks like ABCBA. John Beck, in “Biblical Chiasmus: Exploring Structure for Meaning,” argues that, in biblical studies, chiasmus must contain a significant central element connecting the first and last phrase. Whenever the center pivot point is present, that point is of crucial importance for scriptural interpretation and even rhetorically symbolic of Christ at the center of the on the chiasmic cross. However, many other biblical scholars define chiasmus with or without a center (Man 146-147). This formal definition of chiasmus

will be central to connecting Turing's body with the knowledge he produced. And this argument that Turing's body matters for this thinking is especially unusual considering that this article, "On Computable Numbers," contributes to a field that had long created and maintained a notion of knowledge and truth in mathematics that are separate and free of the weight of bodies.

Universal and Relative Schools of Mathematics

I will review, as briefly as I can, the major theoretical conversations and trends into which Turing was contributing and also intervening. Understanding this context is significant for my goal of identifying chiasmic rhetoric in this article because we find that Turing was engaging with a discourse community that rigorously separated abstract logic from any kind of material or embodied context. Given this context, Turing's inclusion of embodied experiences is an especially surprising and also especially disruptive inclusion. Connections between material and logical theory are atypical for the field of mathematics. In his glossary of scientific words, biochemist and science fiction writer Isaac Asimov, defines mathematics as an abstract science with no necessary connection to material reality. He also notes that the abstract nature of mathematics is part of its appeal for Plato and other pursuers of universal truth. Max Newman, this more concrete thinker, advised Turing on his undergraduate thesis and also taught Turing the principles of mathematics, which covered Bertrand Russell and J. H. C. Whitehead's *Principia Mathematica*, David Hilbert's "Mathematical Problems," and Kurt Gödel's theorems of

incompleteness and incompatibility (“On Formally Undecidable Propositions in Principia Mathematica and Related Systems I”).

Russell, Whitehead, and Hilbert represent the old guard of modernist logic and mathematics. They pursued universal principles that would explain all phenomena. These universal principles of mathematics would, as Hilbert, Russell and Whitehead hoped, create order and control out of an otherwise chaotic world (Leavitt 40-41). Hilbert published his attempts at universal foundations for mathematics and logic in 1901. This was a new century, and this would be a century of order, logic, and reason. At the same time Hilbert published his 27 problems. These problems were, according to Hilbert, the most significant questions for mathematician. With the publication of these questions, Hilbert set the agenda for theoretical mathematician (Hodges 91). The three most significant problems were “Is mathematics complete,” “Is mathematics consistent,” and “Is mathematics decidable.” Together, these questions defined mathematics as a science. Hilbert posited these as questions, but he also assumed that with time mathematicians would find positive solutions to these questions. The program for mathematics, as Hilbert defined it, was to prove that mathematics is complete, consistent, and decidable (Copeland 46-47; Hodges 91; Leavitt 40). This means that mathematics would always, given enough time, be solvable. Evelyn Fox Keller argues that mathematics maintains a significantly different relation to knowledge and epistemology than the sciences like chemistry, biology, or physics. These later fields are all connected and base knowledge from material reality. Mathematics, on the other hand, is separate from material reality. During the end of the 19th and the beginning of the 20th century, mathematicians like

Hilbert assumed that mathematics was inherently logical, internally consistent, and ultimately solvable. This is significantly different, Keller points out, from sciences that draw knowledge from material phenomena due to diversity and variability of physical world. Especially for Hilbert, the mathematical and logical universal forms are there to be discovered. He was, as Leavitt points out, a Neo-Platonist (39). Logic and mathematical axioms were Absolute True forms that existed above and beyond any human experience. These axioms needed to be discovered through rigorous methods of logical proof. Leavitt notes that Hilbert metaphorically referred to mathematics as a paradise of logic and reason (40-41). Hilbert and his school of mathematician wanted above all else for logic, reason, and formalism to create order out of chaos and to let peace win out over the absurd, purposelessness of war. But the 20th century brought with it many challenges to the hope for complete mathematics as well as WWI.

After WWI, a younger group of mathematicians began to trouble the waters in mathematics. In particular, in 1931 (Turing was in his first year at King's College), Kurt Gödel falsified the first two problems: he found that mathematics is not complete and that it is not consistent ("On Formally Undecidable Propositions in Principia Mathematica and Related Systems I"). Copeland explains Gödel's theorem: "if the system is consistent, there are statements of arithmetic that are not provable in the system—the formal system fails to capture the 'whole thought content' of arithmetic" (48). This means that mathematics is not a totalizing science capable of solving all of its problems without drawing from non-mathematical means of signification, formalism, and information. With these theorems, Gödel showed that the paradise of mathematics would

always be full of black holes and that snakes would always lurk in the trees. These schools of mathematics also represent significant political shifts (Leavitt 39). In particular, the older group of mathematicians held idealist notions that reason, if rational humans could only apply mathematical principles appropriately, would bring order and also peace. That was the dream in 1900. By 1936, with one world war past and another on the horizon, the hope was gone that universal forms could bring order and peace to human knowledge and human civilization. All of the younger generation of men would go on to play some part in WWII, building computers for everything from cryptology to atom bombs. The younger generation of mathematicians seemed to take disorder, chaos, and paradox as an unavoidable given. Gödel and others even found disorder, chaos, creativity, and even intuition in mathematics, the most objective, ordered science.

Gödel's findings were groundbreaking, but they still left mathematics with the authority of decidability. In other words, mathematics could always, given enough time and the correct procedure, find a solution to mathematical problems. Gödel felt that there must be a way to falsify this claim, and he worked, unsuccessfully, for over a decade to find the logical proof. This is the question that Turing tackled and his proof, almost inadvertently, invented digital computation. One comment in particular that Newman made may have been a starting place for Turing's thinking. Newman referred to Hilbert's "definite method" for deciding all mathematical problems as a "mechanical process" (Hodges 93, Copeland 206, Leavitt 53). Newman likely used the word mechanical metaphorically, not literal machinery but mechanistic processes performed by *human* computers, who were mostly female clerical workers (Chun 38-41). Leavitt explains,

“The word “mechanical,” in its original sense, had referred to manual occupation, a work performed by human beings. By the 1930’s, however, mechanical meant gears, rotors, vacuum tubes” (54). Newman, like Turing would continue, approached the pursuit of a definite method for mathematic as a physical process. The difference is that Turing would translate the physical process of a human solving a problem into a machine solving a problem.

Turing’s Place within Mathematics

Turing enters these conversations as a young man, a relative outsider, and as a materialist. From this position, Turing was able to solve a long-standing problem within mathematics. And his solution, which is to way that mathematics was not a decidable science, contributes towards the shift away from purely abstract, universal notions of mathematics.

What is especially significant for this dissertation is that he begins with the embodied process of human computers, thereby intersecting embodiment with abstract mathematics. There are volumes of work on the significance of this article for mathematics, computer science, and digital computation⁷. I am not attempting to extend these discourses, which are already quite rich. This is especially true considering that Turing’s article is a foundational text for the theories of computer science. I am seeking to contribute to scholarly discourses on rhetorics of science and rhetorics of bodies. I will

⁷ Of these, I highly recommend for their detailed and accessible explanations of Turing’s theories Copland, *The Essential Turing*; Petzold, *The Annotated Turing*; Agar, *Turing and the Universal Machine*.

draw from much of this research in order to analyze “On Computable Numbers with an Application to the Entscheidungsproblem.” In this, we find scientific and technical rhetoric in which the chiasmic relations between bodies and discourses of abstract mathematics intersect in a way that is central to Turing’s argument and Turing’s machine. This chiasmic relation between bodies and abstract mathematics then became the foundations upon which Turing, Newman, Von Neumann and others build digital computers as well as the field of computer science.

In “On Computable Numbers,” Alan Turing accomplishes two primary things: he shows that mathematics is not a decidable science and, in order to make this conclusion, Alan Turing also invents the Turing Machine, which became a significant logical foundation for the digital computer, although even Turing didn’t see its significance at the time⁸. In this article, Turing proves that the problem of decidability could never be solved by *effective method*, which is the method of logical and mathematical proof in which problems are solved through finite steps and precise instruction so that the solution can be reproduced exactly.

Copeland stresses that Turing’s argument specifically addresses mathematics through effective method. Copeland finds that scholars most often get this point wrong in

⁸ This is a complex, theoretical, and esoteric article. The article is partially composed of surprisingly conversational exposition and unreadable equations of symbolic mathematics. As a scholar far outside of mathematics and computer science, I do not claim to understand the full complexity of this article, especially as it relates to mathematical symbolism and mathematical proofs. However, this article has been studied and explained at length by experts in mathematics and computer science. Of these, I will draw primarily from the work of John Copeland and Andrew Hodges, who are both scholars of mathematics and the history of computing. Copeland in particular offers insights as an expert in philosophical logic as well as mathematics and the history of computing.

so far as they conflate effective method of calculation with all methods of calculation (“Narrow Versus Wide Mechanisms”). Copeland identifies this as the Turing-Church fallacy: the claim that Turing found that mathematics was unsolvable by any methods. Copeland clarifies that some mathematical problems are not solvable through effective method. The key difference is that Turing proved that effective methods (or computable methods) cannot solve some problems. As Hodges explains, this question means “did there exist a definite method which could, in principle, be applied to any assertion, and which was guaranteed to produce a correct decision as to whether that assertion was true” (91). In *Turing’s Man*, Bolter identifies this method with all abstract, symbolic logical proofs.

Turing offers the Halting Problem as one problem that cannot be solved through effective methods. If a computer (either human or machine) was given the Halting Problem, the computer could calculate the algorithm but would never reach a conclusion. The mechanical (or electric) computer is important here because Turing needed to prove that a problem would run forever without solution. If a single human being were calculating the problem, the time spent calculating and the accuracy of the calculation would be necessarily limited. On the other hand, when Turing replaces each activity of a human computer “working in a disciplined but unintelligent manner” (as he writes in his manual for the Manchester Electronic Computer Mark II) with a machine, then the machine can run infinitely. In the case of the Halting Problem, the computer would run infinitely because the problem would circulate back repetitively. Turing proved the limitations of effective methods, but alternative methods may still be utilized to solve

those problems that are undecidable through effective methods. Later in his career, Turing would turn to methods of random selection and intuition to as possible alternatives. I will next provide a more complete exposition of chiasmus in order to establish the first movement of chiasmus, which is that chiasmus always connects.

Positioning Chiasmus Between Antithesis and Parallelism

Although I argue for a shift from antithesis to chiasmus as figures that structure the relation between bodies and knowledge, the antithesis and chiasmus are actually closely related. In fact, Lanham defines antithesis as a kind of chiasmus (125, 133). Both figures create relations between two different things. In addition, both figures, when they are defined in relatively strict formal terms as Fahnestock does, are composed of two phrases that are connected in order to emphasize difference, contrary, or comparison, or changes in degree. However, antithesis creates a relation that emphasizes opposition. Especially in the case of contrary antithesis, this is a relation of mutual exclusivity where no intersection or interaction is possible. In antithesis, bodies and everything associated with bodies are cut and separate from discourse and knowledge production. But chiasmus is a complex figure and creates a complex relation.

Chiasmus is also includes formal parallelism. Parallelism is a rhetorical figure in which syntactical and semantic similarity repeat in at least two phrases. In actuality, parallelism is so common and so often desirable in composition that it is much more than rhetorical figure; this is a formal aspect of almost any piece of writing that structures everything from sentences to whole arguments. Parallelism is used to emphasize equality,

balance, and similarity. Parallelism could be thought of as two parallel lines. Like in Euclidian geometry, two parallel lines on a plane will never intersect. The relation created in parallelism is one of parity, equality, or balance. While antithesis creates an impression of separation and mutual exclusivity that conceals any points of similarity or sameness, parallelism is the opposite. Parallelism conveys a sense of sameness or equality even though there may be no connections between the two concepts or phrases.

Chiasmus creates a relation that allows for both the difference that we find in antithesis and the equality or balance that we find in parallelism. But there is one significant difference: chiasmus always connects. With antithesis, the relation between the parts divides to emphasize opposition. With parallelism, the relation emphasizes similarity, but that similarity is always between parts that separate. Chiasmus must, by definition, create intersections between two things just like the X in *chi*. Connection is the key to chiasmus' rhetorical force. While antithesis and parallelism can be read linearly, chiasmus must be read by interpreting the levels of intersections. This means that reading must go back and forth between the different sides, with the meaning changing through the complex set of interactions back and forth. Chiasmus may take many forms, shapes, and sizes, but chiasmus always connects.

Bodies in Turing's Mathematics

According to many scholars, Turing is a thinker who creates more distance between mind or thinking and bodies and human embodied experience. This claim is most obvious in J. David Bolter's book *Turing's Man*. Bolter's research focuses less on Turing's life or his

theories than about the larger trends in our understanding of our relationships between humans and our technologies. According to Bolter, “Turing’s Man” is a way of understanding the human body and human life as immaterial, purely logical, and regulated. When Turing invents his Turing machine, according to Bolter, he embodies pure logic. Bolter’s larger argument is that this invention then becomes the primary metaphor framing how we understand human bodies and life. Humans then, are also understood as pure logic, as computing machines who process information and are hardwired in particular ways. In a lot of ways, Bolter’s claim is justifiable in Turing’s article. Turing literally integrates a human computer into a mechanical computer. He starts with what a man can do; then he writes on top of that what a machine can be made to do. In particular, this was taking the human work of logical proofs and writing that in code. According to this logic, by ‘embodying’ abstract logic into digital, electric computers, Turing and a cohort of scientists including John Von Neumann, Alfonso Church, and George Stibitz created a pure logic machine.

When Bolter writes of ‘embodying logic’ he does not mean human bodies or bodies in the sense of an organic physical form. Instead, embodying means to give a material or concrete form. This argument presumes that logic can be and has been disembodied or without any material form. Feminist philosophers, who emphasize the situated construction of logic, truth, and knowledge, have routinely critiqued this argument. Andrea Nye posits one particularly focused critique in *Words of Power*. She traces the material, political, and social intersections with the definition of logic. This work adds nuance to Bolter’s claim in a number of ways. First, logic is not a single,

timeless concept but a fluid and evolving notion of what is accepted as valid and objective reason. Second, her research demonstrates that, although the definition of logic is associated with objectivity, the very definition of logic is always constructed in particular material circumstances. In this way, logic has never been disembodied. Logic is always already in a chiasmic intersection with material and bodies.

Turing does come from a generation of thinkers who idealized abstract logic, but his writing and theories are surprisingly embodied. Gödel and Hilbert were proponents of abstract, formal logic. There is no doubt that Turing also held some of these notions. However, this is not the only way that mathematics was understood. Another Cambridge mathematician who Turing studied and also was commonly in contact with, G. H. Hardy, critiqued Hilbert for pursuing abstract logical forms. Hardy understood mathematical logic in material terms of games in which the different aspects of mathematics are “the material with which we play” (35 in Leavitt). In this mathematical game “the axioms correspond to the given positions of the pieces, the process of proof to the rules for moving them, and the demonstrable formulae to the possible positions which can occur in the game” (Hardy 35 in Leavitt). Likewise, multiple biographers note that Turing was a surprisingly concrete thinker. When he writes about effective method of mathematics, this effective method is a concrete process performed by a concrete body. The point here is that Turing understands logic and mathematical process in materialist, concrete, embodied terms. Turing’s chiasmic rhetoric features embodied processes of computation that are already connecting with discourse.

Chiasmus Acting to Take Space and Connect

Having defined chiasmus in both rhetorical theory and in feminist theory in chapter one, I will now continue this examination by discussing what chiasmus does—what is its rhetorical and performative power—as a figure in writing as well as a figure connecting bodies and words. Jeanne Fahnestock argues that figures of speech can only really be understood in terms of what the figure does well (23). Likewise, Arthur Quinn defines the figures of speech by what they do in and for a particular text (2). The emphasis of this question is on *doing*: a verb and action. The focus on action is crucial because I will be working, in part, from the theoretical perspectives of material feminists, in particular Judith Butler and Karen Barad and other feminists who theorize bodies, sex, gender, difference, and power relations as sets of interactions and performances. These performances are constantly being done and redone, shaped and reshaped. As such, the focus on action, performance, and phenomena resists defining a single, stable relation between bodies and language.

Figures Taking Space

Chiasmus takes up space. By repeating terms on both sides of chiasmus, the figure inherently includes redundancy. But refusing concision, chiasmus establishes its importance through spatial arrangement. This is one of the defining qualities that Arthur Quinn notes “such a spatial technique, with its obvious analogies to painting, can be used to organize larger and larger units of material” (95). How may chiasmus work in painting? Consider Michelangelo’s *Last Supper*. The spatial organization is centered

around a middle point, Jesus Christ, with balanced but different arrangement of disciples on each side. The organization creates a number of effects. First, it focuses the painting not on the right or the left side, but on the point of connection and interaction in the middle. In addition, the spatial organization creates a sense of balance and parallelism. The disciples on each side are separated, but the balance gives a sense of unity or wholeness. The image is split, but the composition as a whole appears unified. My eye focuses first on the center and then only gradually out to the left and right. There is no specifically linear way to read this image. Instead, the eye moves from center out, back to center, and out again and again. Likewise, chiasmus as a rhetorical form in text is a spatial form that intersects differing parts. Chiasmus takes space on the page as well as it does on the canvas. The repetition of terms refuses any desire for concision.

This particular way of taking space requires a chiasmic way of reading. The chiasmus changes the reading process into a non-linear process. In an ABBA or ABCBA structure, or even an ABCDEDCBA structure, the meaning of the text only becomes clear when read from the outside corresponding parts into the center: the reader must move from AABB to AA BB or from ABCDCBA to AABBCCD. Take the biblical example: “Do not give what is holy to dogs. And do not throw your pearls before swine. Least they trample them under their feet, and turn and tear you to pieces.” Read linearly, the swine both trample the pearls under feet then turn and tear apart the addressee. However, read chiasmically, this verse is balanced through the reversal of the phrases.

A - Do not give what is holy to dogs.

B - And do not throw your pearls before swine.

B - Least they trample them under their feet, and

A - turn and tear you to pieces

Should be read chiasmically as:

A - Do not give what is holy to dogs.

A – [lest they] turn and tear you to pieces

B - And do not throw your pearls before swine.

B - Least they trample them under their feet, and

This makes reading the text much like peeling an artichoke: we have each the outside layers, gradually eating until we finally get the sweetest artichoke heart. One cannot simply cut through the outside layers to get to the center. This chiasmic process of reading preserves the relation between corresponding parts. Reading this, chiasmus is a process of folding and refolding the figure to compose meaning and argument. In addition, when the figure has a pivotal center, the process of reading each part in its relation to the center. Upon that center, everything else revolves. The first half of the text builds up to that point and the second half of the text unravels from that center pivot point. By taking space, and considering the particular shape that chiasmus takes space on the page, this figure frames and guides the reading process, which becomes embodied in and through it.

Bodies Taking Space

This taking space is also a crucial concept for feminists. Bodies are physical and as such they take physical space. This may seem to be obvious; however, feminists have needed to reiterate this obvious experience because, within philosophy, political discourse, and rhetorical theory, it is the very physical existence of bodies that is consistently overlooked or undervalued. Although this feminist focus on bodies is a long one, within the last 25 years, this debate has coalesced around a critique of philosophy and theories that are variously called the linguistic turn, cultural turn, the rhetorical turn, and feminists have responded by turning towards bodies⁹. For example, Elizabeth Grosz challenges social constructivists notions of bodies, which continue to be prevalent. Social construction definitions of bodies, as Grosz grants, de-naturalize the body by demonstrating the many ways that language and culture construct the “natural body.”

This definition is important and politically valuable for feminists because it liberates women from the burden of sexist notions of women’s bodies as essentially feminine, weak, or irrational. However, their efforts to demonstrate how culture constructs bodies often posit definitions of bodies as passive ‘blank paper’ on which active language and culture shape without resistance. Moira Gatens persuasively demonstrates that this re-inscribes mind body dualism so that culture and language are

⁹ This new material feminist critique of the linguistic turn is articulated by Gatens, Grosz, Braidotti, Barad and others. A useful summary of this critique can be found in Susan Hekman’s *The Material of Knowledge*. Sarah Ahmed, in “Imaginary Prohibitions: Some Preliminary Remarks on the Founding Gestures of the New Materialism” adds useful nuance to this critique by: 1) identifying ways that new material feminists straw man the linguistic turn, and 2) identifying material and bodies as crucial to some aspects of the linguistic turn.

constructive forces while matter is passive and dumb (*Imaginary Bodies*). Karen Barad, as several others do, charges the linguistic turn with once again erasing bodies. But the critique is more extensive. The linguistic turn hasn't just erased bodies; it has also erased matter, reality, and the physical. In the place of material and physical, language and semantic language as code have been elevated as the highest epistemic value. "Language has been granted too much power," Barad charges; "it seems that at every turn lately every 'thing'—even materiality—is turned into a matter of language or some other form of cultural representation" (*Meeting the Universe Half Way* 132).

In addition to their critiques of the linguistic turn, feminist theorists have also posited various theories that affirm bodies as active and productive in both epistemology and ontology¹⁰. In fact, the turn towards bodies has been initiated in a variety of academic fields, notably led by Bruno Latour. However, as Susan Hekman argues, feminists have been at the forefront of these efforts. Their work has been particularly significant because, unlike Latour and other STS scholars, feminists approach their research with an attunement to the power relations and systems of privilege and discrimination that shape politics as well epistemology. Heckman reminds us that feminists need material reality and bodies. Feminist projects depend on material reality for "making true statements

¹⁰ This collection of feminists is often labeled "New Material Feminists." Other labels for this feminist theoretical school include "corporeal feminism" (Grosz) and "agential realism" (Barad). Hekman argues that the fact that these feminists have not yet been identified under a single school of thought indication of the "newness of the approach" (68). I would add that the difficulty in labeling this group is also due to the diversity within this group of feminists, which range from Barad's engagement with quantum physics to Garland-Thompson's materialist approach to disability studies. This school does share in common the commitment that bodies emerge from the intersection and interactions of materials and languages.

about the reality of women's lives—their oppression, their inferior social status, the pain inflicted on their bodies. Without the ability to make true statements about women's lives, feminism, like science, makes little sense" (66). In order to make political and ethical claims about women's lives, we must be able to make fact claims on the basis of material reality. Among those claims to reality are that women's real lives, knowledges, and experiences are undervalued, marginalized, or targeted with violence. Feminists need to be able to identify and critique the "unbearable weight" of our bodies (Bordo) and the points of pain and hurt that come with our embodied experiences (Wendall). Elizabeth Grosz has argued that our bodies are resources for knowledge ("Bodies and Knowledge," *Volatile Bodies*). And Adrianna Cavarero writes that a human body that is always unique, particular, and never-repeatable, and this unique body is constitutive of our ontology. In order to make any of these claims, bodies must be understood as material phenomena that take physical space in material reality.

Figures Intersecting

Chiasmus, in this first movement, intersects two different things in ways that reflect feminist critiques of body and language discussed above. The move to intersect is the common denominator among all of the different definitions of chiasmus in rhetoric and also a constitutive of the relation between bodies and discourses in the feminist theories. As a rhetorical figure, chiasmus connects two phrases or concepts. As an embodied figure, chiasmic rhetoric intersects bodies with discourse. And this intersection can be active toward knowledge production as well as the production and disciplining of bodies.

I will first discuss how the intersecting move of chiasmus from rhetorical theory and then demonstrate how the same chiasmic intersection figures prominently in feminist theories of bodies, especially for Judith Butler.

Chiasmus figures the relation between bodies and discourse because the rhetorical figure allows for a complex relation of balance and similarity found in parallelism as well as the difference and divergence of antithesis. In his close reading of Miguel de Unamuno's novels, Paul Olson traces how chiasmus works as a formal device connecting flesh and word. Through this formal structure, Unamuno's novels use chiasmus to frame words and flesh as mutually dependent entities without ever collapsing one into the other. This complex intersection is crucial for the figure's rhetorical power. This intersecting figure creates complex relationships between parts. Fahnestock writes that chiasmus, and the specific sub-class of chiasmus, antimetabole, is causal in opposite directions and reversible: "The antimetabole expresses an interchangeability that suggests not identity but mutual constitution" (141). The two terms co-construct their meaning and rhetorical force. She also writes that within science writing, chiasmus is most often used to define relations of "reciprocal causality" and "mutual dependence" (141). Rhetorically, this figure creates "a sense that the two entities always require each other and therefore cannot be separated" (141). This will later figure the relation between bodies and discourse co-construct each other and cannot be understood outside of that co-construction. Similarly to Fahnestock, Richard Lanham uses the example "do unto others as you would have them do unto you" in order to demonstrate how chiasmus emphasizes mutual reciprocity (*Analyzing Prose* 123).

Fahnestock also explains that this principle of reversibility, that the causal relationship is co-constructing, was crucial for Aristotle's notion of chiasmus. In *Topics*, Aristotle uses examples of chiasmus as a premise-generating machine (Fahnestock 132). Chiasmus had to be reversible and the phrases have to make sense both ways. "Since one term so depends on the other, it does not matter which comes first, and indifference displayed iconically in the syntax of the figure" (141). For instance, "if the honorable is pleasant, what is not pleasant is not honorable" (133). The phrase "a human is a body and a body is a human" does not work when reversed. That is because the two terms are a genus-species relation where body is a larger category under which human is contained. In order for chiasmus to generate logical theses the relation between the two things must be parallel or balanced (132). Just as chiasmic figures of words create balance and reversibility, so too bodies and discourse are connected so that one does not determine or dominant the other. Rather, bodies and discourse are co-constituting.

Intersecting Bodies and Discourse

Intersecting is also a crucial concept for feminist theories of bodies. In particular, bodies are defined at the intersection of material, culture, language, and power relations. It is through these intersections and interactions that human bodies are meaningful and sensible. Butler describes this intersection explicitly as chiasmic. For instance, in *Bodies that Matter*, we find that "language and materiality are fully embedded in each other, chiasmic in their interdependency, but never fully collapsed into one another, i. e.,

reduced to one another, and yet never fully ever exceeds the other. Always already implicated in each other, always already exciting one another” (38).

This definition of the chiasmic relation between bodies and language includes the exact same qualities that define the rhetorical figure chiasmus: through both parallelism and antithesis, the two entities are connected, interdependent, but never collapsible. As both parallel and antithetical, “language and materiality are never fully identical nor fully different” (38). Now, when Butler writes about materiality, she is using a particular notion of materiality. This is not the common usage of materiality. Instead, she is thinking of materiality that is always already constituted in and through language. She clarifies this notion of materiality in her introduction to *Bodies that Matter*. Although she has been criticized for making bodies passive to the construction power relations, in fact, her intent is to “return to a notion of matter, not as a site or surface, but as a **process** of materialization that stabilizes over time to produce the effects of boundary, fixity, and surface we call matter” (xviii). In other words, she is interested in the process and performances, by which the appearance of stability is created. Again, this is a definition of bodies that resists fixing the qualities and stasis. Instead, the focus of the definition of this relation is always on action, process, and performance. Bodies are not understood so much as things to be defined and more as embodying actions that are phenomena to be studied.

This focus on action and process is most explicit in the work of Karen Barad. She approaches her feminist theories of embodiment first as a physicist and expert on Niels

Bohr's theories of quantum mechanics¹¹. No doubt Turing read the work of Bohr, especially his contributions to quantum mechanics, which were central to Turing's materialist world-view that also allowed for some random or unexplained phenomenon. Barad defines the material-discursive reality through a theory of agential realism, which claims that if we shift our focus from identifying things and matter and towards the study of actions, phenomena, and process, then we can understand discourse and matter as fully entangled and as always enacting a form of agency. Barad argues that material and discourse are intersecting in a constant state of in-ta-action.

In this context, discourse could be understood as any relationality between entities. Like Grosz's definition of embodied subjectivity and Butler's theory of performativity, the body is the site of contestation or negotiation between material and culture. Within these negotiations between material and culture, both have access to agency in so far as both determine and affect the other. However, Barad takes this argument one step further by arguing that neither material or culture exist before in-ta-action. Rather, all material and meaning emerge through in-ta-action. This means that the foundation of human ontology requires interaction with other things, beings, and discourses in order to come into being.

The process of inter-action is constant. With new inter-actions and new discourses, the agential material changes. At the same time, as discourse and culture encounter and entangle new material, the discourse and culture adjust and adopt.

¹¹ Both Bohr and Turing's work are influenced by Heisenberg's uncertainty principle. In addition, both Bohr and Turing met with Heisenberg in Princeton. However, Turing was at Princeton before WWII started and Bohr was there during WWII in order to discuss Heisenberg's work on the atom bomb.

Meaning/discourse and material/bodies are in a constant process of in-ta-action, negotiation, and co-constitution.

Barad's theories go beyond most feminist theories of the body in two primary ways. First, a thing or a meaning emerges not only through inter-actions between matter and discourse, but also through the interactions of matter and matter. In this way Barad's theories focus on matter, even matter outside of human experience. Second, Barad identifies a form of agency with all matter, not just human consciousness. This is not a normative use of the word agency, which is often defined as a quality a subject possesses or does not possess and that is enacted with intention. Instead, agency emerges through intra-actions and entanglements between phenomena. With this definition, agency is the ability to impact or shape other phenomena, even if that impact is through resistance or recalcitrance.

Bruno Latour and similar scholars of Actor-Network Theory also contribute to the study of science and technology. In particular, this scholarship investigates the construction of facts within networks of people, laboratories, methods, with specific technologies and methodologies (*Reassembling the Social*). These complex factors contribute to the construction and circulation of facts. Although this research does demonstrate the social construction of facts, the goal is not to invalidate science or reality. His intent is to move closer to facts and reality by studying how empirical reality intersects and interacts within a full network of material, cultural, social, and personal nodes ("Has Critique Run Out of Steam?" 231). However, as Barad and Hekman both argue, ANT focuses so closely on the concrete actors and actants, it does not account for

the social, political, and cultural forces that contribute to the construction of facts and reality.

Feminist scholars of science, technology and bodies also study the construction of facts. However, they add to this discourse a focus on the political, cultural, and rhetorical factors that influence knowledge construction. The work of Barad makes an explicit connection to the rhetoric of science. In addition, the work of Butler and Grosz establishes that bodies play a central role in knowledge production. As such, these also inform the rhetoric of science. Within the past 20 years, the field of feminist science studies has enacted a shift in science studies and rhetoric of science. In particular, this field has not only contributed to the study of how facts are made and distributed.

This field has also accounted for how facts are made within power relations that construct knowledge, facts, and shape our embodied experience. Ann Fausto-Sterling, who is both a biologist and a feminist philosopher, is most widely known for her feminist critiques of entrenched sexism in scientific discourse. Her work is explicitly rhetorical in so far as she analyzes how the words, categories, and metaphors used in science perpetuate sexism and essentialist notions of gender. For instance, Fausto-Sterling demonstrates our normative notions of two sex is a myth that reduces complex relations between internal genitalia, external genitalia, chromosomes, hormones, and social construction, into two limited categories when at least five categories are needed to define sexual difference (*Myths of Gender* and *Sexing the Body*). Fausto-Sterling's scholarship exposes how complex biological data are constructed and explained in ways

that support sexist beliefs about women, perpetuate essentialist notions of gender, and reinforce gender norms of masculinity and femininity in the study of material reality.

In the case of “On Computable Numbers,” bodies and discourse intersect to construct new knowledge about the foundation of mathematics and also construct the theoretical and applied foundation of digital computation. Attention to Turing’s chiasmic rhetoric makes the connections between embodied experiences and discourse visible. In addition, this chiasmic figuring allows us to see how the chiasmic intersection between embodiment and discourse are constitutive of Turing’s solution to the problem of decidability.

Turing’s Turn Toward Bodies

In this article, Turing composes his solution from a surprisingly concrete, embodied notion of mathematics. This concrete approach to mathematics stems from his relatively new conviction in materialism. Between writing “Nature of Spirit” and “On Computable Numbers,” Hodges explains that Turing lost his faith in an eternal, separate spirit form. Instead, Turing invested more and more in quantum mechanics and applied mathematics as well as the more abstract logical mathematics. When he wrote “Nature of Spirit,” Turing was reading John McTaggart and Arthur S. Eddington with great interest. Both of these writers were adopting the findings in quantum mechanics very loosely in order to find scientific justifications for Christian notions of human spirit and free will in minds that are somehow independent or separate from bodies. Turing clearly wanted to believe that Christopher’s spirit could live beyond his body. He missed his friend. The hope that

science could potentially explain the continued life of Christopher's spirit drove Turing to consider scientific justifications for spirit's transcendent life after a body's death. And this this time, Turing could more readily reinscribe antithesis between bodies and minds. However, Turing was also a rigorous and committed scientist. College for Turing, like so many of us, led down a path of commitment to alternative forms of knowing that contradicted the religion of his youth. Hodges writes that before completing his undergraduate thesis, Turing "would soon emerge as a forceful exponent of the materialist view and identify himself as an atheist" (108).

As a materialist, Turing believed that all phenomena are material phenomena. Nothing exists outside or apart from the matter. However, Turing's materialism is different from an earlier pre-quantum mechanics notion of materialism. The notion of material that he learned as a child, which was a notion that material was inert and mechanical, had been complicated significantly by quantum mechanics. Since Heisenberg introduced his uncertainty principle, matter, atoms, and physics were seen to behave in random, unpredictable ways. As he matured as a theorist, he embraced randomness and uncertainty as inherent in material life. This shift towards materialism also complicates the relations between bodies and abstract through. Or, to put it more precisely, his shift towards materialism means bodies and material would intersect with discourse, even in the most abstract theoretical proofs.

Equipped with this materialist, concrete mode of thinking and Turing's embodied experiences, Turing composes "On Computable Numbers" so that embodied experiences form the very foundation of his abstract theory. In this way, chiasmic rhetoric is the

relation between embodied experiences and his theoretical writing, which together produce new knowledge within the field of mathematics. And feminist theories of science studies remind us that not only are these abstract theories and bodies connected, they are also all implicated in similar social, political, and cultural dimensions. In later chapters I will call further attention to the connections between Turing's ideas, his body, and also the larger social system in which his ideas and body were composed. Next, I will highlight three primary ways—in his style, his method, and his conclusion—that chiasmic rhetoric intersects bodies with Turing's theoretical contributions to mathematics and later to computer science.

Turing Intersects Bodies and Logic

Chiasmic rhetoric intersects bodies and Turing's thinking first, on the level of style. The style the Turing uses in this article is surprisingly concrete and even conversational. The most obvious way that Turing connects these abstract proofs with his concrete life is with the first person pronouns. He personally claims each of his arguments with "I give some arguments" and "I show..." (58-59). He also connects himself with his readers with the pronoun we when he writes comments like "We may compare a man in the process of computing a real number..." (59). Turing uses these first person pronouns throughout the article. Even though much of this text is composed of symbolic numbers and equations, much of the article is also composed of surprisingly conversational tone. This style does not conform to established conventions of scientific writing, which include introduction, methods, results, analysis/discussion (Penrose and Katz 93-95). However, these primary

parts can be interpreted as present. In fact, Turing explains his ‘method’ of effective method throughout. This method of solving the problem of decidability is also, for most of us, his most meaningful contribution. His method requires him to build a machine that becomes the prototype of a digital computer.

A second way, and more obvious way, that bodies are in chiasmic intersection with Turing’s thinking in this article is through his method. His method of solving this problem begins with the embodied human process of calculation. When he writes, “imagine a computer...” Turing is referring to a person, in Turing’s case ‘a man’ although computers were most often women (Chun, Bolter). Turing then describes the process of computing as a physical process: This man sits at a desk, writes with a pen, on paper, reads instructions, and moves the paper along from one step to another step of the instructions. Turing describes the paper that the man uses. Turing’s man, this computer, is given very complex calculation, which was typical and tedious. These calculations would take any man a very long time, which means he would have to take breaks. “It is always possible for the computer to break off from his work, to go away and forget all about it, and later to come back and go on with it. If he does this, he must leave a note of instructions, written in some standard form” (79). Before stopping he would need to write down instructions for himself “in some standard form” in order to know what to do next. Then, Turing suggests, “suppose that the computer works in such a desultory manner that he never does more than one step at a sitting” (79). This man has to get up after each step... perhaps to get a drink of water or stretch. Each step of the calculations must be written down in the most basic terms.

This embodied experience of a lazy man writing down instructions is the basis on which Turing invented the digital computation. These instructions for each step become the prototype for software. These are the instructions that tell computers each step. Then Turing describes a kind of machine that can read the tape, mark 0 or 1, and move the tape from right to left. With these simple functions, Turing invents the very basic model of the hardware for computers. Hodges noted that Turing's method of solving one of the central questions of mathematics "but it was not only a matter of abstract mathematics, not only a play of symbols, for it involved thinking about what people did in the physical world... All he had done was to set up a new model, a new framework" (107).

This method of embodying the process of computation was considered highly unusual. Hodges calls his method unique for its "definite, down-to-earth resolution of the paradox of determinism and free will, not a wordy philosophical one" (108). Bolter calls this method "strange" and even "simple-minded" (169). Its originality can be seen most clearly when comparing it to Alfonzo Church's method for solving the problem of decidability, which was published just a few short months before Turing's article. Church's "well formed formula" is comparable to the Turing machine, as Turing admits in the appendix to his article (88). However, Church remains abstract. The formula is equally as functional for concluding the problem of decidability. However, Church never discusses how the formula would be calculated. He was not attentive to the physical process. Turing's thinking is unique in so far as he is thinking very literally and concretely about the physical processes of calculation and mathematics. By starting with

the embodied process, Turing ties mathematical theory directly to the concrete, embodied process of performing calculations.

This concrete, embodied method was the key to the invention of digital computation. As Hodges wrote, this solution was almost too applicable and concrete. Hodges writes that, when Newman, Turing's mentor who taught a course on the Foundations of Mathematics at King's (Hodges 90) read the article, Newman, "could hardly believe that so simple and direct an idea as the Turing machine would answer the Hilbert problem over which many had been laboring for five years since Gödel had disposed of the other Hilbert questions" (112). Theory was the drug of the day. According to William Pager, an American mathematician who contributed towards computer developments in the US, "there was a widespread belief that you turned to applied mathematics if you found the going too hard in pure mathematics" (in Rees 607). And Hodges comments regarding Turing's turn to application that "such a foray into the practical world was liable to be met with patronizing jokes within the academic world" (157). But Turing solved this theoretical problem by starting with the least theoretical place: a man, sitting, at a table, with a pencil and paper. In particular, the kind of paper a child would use to work through math problems. What could more simple? And starting in this place, Turing entered the field as a relative outsider, solving a theoretical problem through very concrete methods.

Finally, chiasmic rhetoric allows us to see that bodies take space and intersect with Turing's very conclusion. This form of taking space is more subtle but still significant. When Turing concludes that the problem of decidability could not be solved

through effective methods, he proves mathematics will always be in some ways unexplained and unexplainable. Using effective methods of logical proofs, a Turing machine could calculate some problems, like the halting problem, but the problem would need to be calculated infinitely without ever coming to a conclusion.

Turing's conclusion is the final end to the dream posited by Hilbert and an entire school of mathematics that imagined mathematics as a garden of logic, order, and control. Turing's conclusions, in effect, derail the drive to control within mathematics. And in order to make this final blow to ideal mathematics, Turing had to start with a chiasmic relation between bodies and knowledge. Although he does not explicitly discuss quantum mechanics in this article, he studied it at length throughout this time period and goes on to investigate quantum mechanics in more depth after publishing this article. Quantum mechanics had decades earlier proved that not all material phenomena were explainable. There would always be some mysteries to the material universe. However, because mathematics is defined as abstract and without matter, some mathematicians continued to maintain that math was solvable and that mathematical principles could eventually rid this logical science of mysteries and randomness. Turing's materialist understanding of mathematics, logic, and bodies, then, became the foundation on which he toppled the abstract, formalist, modernist notions that numbers and mathematics may somehow be an abstract, perfectly logical, universal science. By applying materialism and quantum mechanics, Turing insists that mathematics must be material and physical process. Starting from this commitment, he was able to demonstrate the limits of mathematical knowledge and of mechanical calculations.

Intersecting Bodies without Difference

By defining chiasmic relations in which bodies and discourse are always already intersecting but also exceeding each other, Butler's arguments allow me to refocus a reading of Turing's writing so that we can see the deeply integrated ways that embodied experiences inform and shape his knowledge production. By starting with bodies, Turing was able to clear the theoretical air and make great progress. In this way, bodies intersect directly with Turing's thinking, invention, and writing. Here, the chiasmic rhetoric moves to connect bodies and discourse. Although this is a simple movement, for Turing, his rhetoric that intersects bodies and discourse allowed him to solve abstract mathematical theories, develop the foundations for computation, and also challenge the long-standing believe that mathematical knowledge is separate from material and therefore freed from the limitations and variability inherent in our material world.

Turing was certainly not the first to try to build a thinking machine. A century earlier Ada Lovelace and Charles Babbage worked to invent an analytical engine that they hoped would be a thinking machine. At the same time as Turing was writing this article, John Von Neumann was at Princeton trying to create a computation machine but was stuck on the logical foundations (Copeland 23-25). Turing was reading Von Neumann's work throughout the 1930's, and Von Neumann gave a series of lectures at Cambridge that Turing attended. But Von Neumann was making it too complicated. He had the correct hardware, but his coding was too complicated and cumbersome. The beauty of Turing's invention, again, was in its simplicity.

However, the bodies that we find in Turing's chiasmic rhetoric are not rich notions of human bodies. Instead of human embodied difference, Turing makes explicit a long-standing metaphor between human bodies and machines. Turing writes, "We may compare a man in the process of computing a real number to a machine which is only capable of a finite number of conditions" (59). Hodges explains at multiple points how commonly the notion of man's body as a machine would have been to Turing (96, 107). This metaphor, then, would have been an easily accepted starting place for Turing's theoretical claims. He came to this project with a mechanical notion of bodies. Based on this mechanical notion of bodies, it seems almost inevitable that he could then easily replace each aspect of this mechanical body with a computation machine.

However productive this chiasmic intersection may be, Turing's particular notion of bodies that he articulates in this article excludes, erases, and ignores many of the rich aspects of human embodiment. Turing's discussion of bodies as a foundation for computation offers a limited perspective on what bodies are and what bodies can do. What do we know about these bodies that Turing has laid at the foundation of digital computation? The only particularities or needs that this body has is 1) male, 2) finite memory, 3) has a hard time staying in a chair for long periods of time, and 4) has different states of mind.

Considering that Turing didn't have an assistant to perform his computations, he was probably imaging his own body. What did he leave out? As Turing sat performing computations he was perhaps in Cambridge. As he wrote this article, Turing was serving as Don at his former school. This position required very little from Turing. He had the

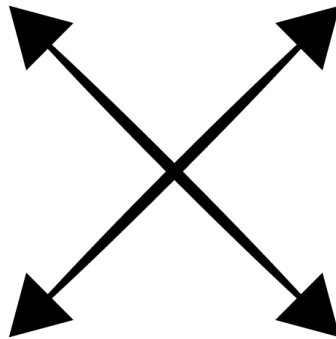
freedom to research and write. He spent his free time with friends, most of whom were other scientists or mathematicians. Turing ran long distances every day. He ran for the runner's high. He ran to keep his body strong and healthy. He also ran to think. We see no particularity of Turing's body in this metaphor of the mechanical body. These particularities may include his overall physical strength, his fair skin, his proclivity for vacationing in sunny places, or his preference for British ale. None of these particularities factor into Turing's development of the computer as a man into a computer that is a machine and a process of formal logic and symbolic forms.

Throughout his life, Turing learned how to dress like a man of privilege. He was taught to value physical fitness, competition, and athletic events. This bodily training was not incidental to his intellectual training: the same values were conveyed in both. The bodily training taught restraint, the importance of conforming to conventions. Likewise, we see in this article how Turing applies the rigorous rules for logical formalism in order to create a machine that can perform calculations. His notion of bodies in "On Computable Numbers" is stripped of the touches of subjective needs or perspectives. Like a man trained to perform in polite, British society, Alan Turing's rhetoric metaphorically learns to walk the walk of acceptable scientific rhetoric. Surely, these embodied experiences must also intersect in Turing's chiasmic rhetoric.

In the next chapters, I will develop chiasmic rhetoric in increasingly complex ways by drawing from increasingly complex notions of bodies. The embodied experiences discussed in this chapter were relatively simple: sitting, calculating, moving paper from side to side. Likewise, the chiasmic move to intersect is also relatively simple.

I have demonstrated that bodies and discourse are inseparable. But I will continue to develop notions of chiasmic rhetoric to include more complex notion of bodies that have been disciplined, constructed, and also punished by a broad set of embodied experiences. Thus, chiasmic rhetoric will develop so that it integrates the social, epistemic, and cultural construction of our bodies. And particularly in Chapter 4, these will include bodily experiences of education and disciplining as they relate to Turing as a subject of governmentality and sexuality.

CHIASMUS 4:
DYNAMIC EMBODIMENTS



*“As you gaze at the flickering signifiers scrolling down the computer screens,
no matter what identifications you assign [in the Turing test],
you have already become posthuman.”*
~ Hayles, *How we Became Posthuman*

*“Playing [chess] against such a machine gives a definite feeling that one is pitting one’s
wits against something alive.”*
~Turing, “Intelligent Machinery”

In the previous chapter, I demonstrated that chiasmus creates a relation that combines the equality and balance of parallelism with the contradiction and distinction created in antithesis. And the foundational first move of chiasmus is to create intersections. Now, I develop these arguments further by demonstrating the dynamic movement of chiasmus.

By dynamic, I mean that chiasmus moves and creates change. This chapter will focus on dynamic movement of chiasmus in which bodies and discourse co-construct each other. This will be seen primarily through a discussion of the disciplinary practices that construct Turing's subjectivity but also the disciplinary practices that construct knowledge or what qualifies as intelligence according to Turing's early work on artificial intelligence. I will also discuss how chiasmus between bodies and discourse are not only discipline but also dynamic in productive ways, in particular, productive for knowledge construction. I will show these dynamic relations, which is both disciplining and productive, through an analysis of Turing's 1948 report "Mechanical Intelligence." In this report, Turing sets out his initial theories of how to train computing machines so that they can gradually learn and eventually demonstrate a form of intelligence. This is significant for our discussion because I demonstrate how Turing's computers and intelligence dynamically interact with embodied experience to produce new knowledge.

Dynamic Chiasmus

Chiasmus creates intersections, but these are not necessarily static intersections. Rather chiasmus figures relations that are dynamic and productive. Jeanne Fahnestock most directly addresses the dynamic qualities of chiasmus within scientific writing. "It is movement," (131) and creates "transformations—like stretching, rotating, translating, and reflecting" (134). The movement of chiasmus creates an experience so that a reader "enters the [chiasmus] at one conceptual location and comes out at another; it has the trajectory of a parabola" (131). Fahnestock finds this figure epitomizing the state of

eternal flux in Heraclitus. Within the rhetoric of science, this dynamic figure can be found throughout Newton's discussion of the third law of motion, which states that for every action there is an equal and opposite reaction. Although Newton does not form this law in the form of a chiasmus, each of his examples are chiasmically structured. For instance, Newton illustrates, "if you press a stone with your finger, the finger is also pressed by the stone" (in Fahnestock 142). Like Newton's law of motion, the two different parts of chiasmus are reversible and co-constructing. The figure "epitomizes arguments concerning reciprocal causality, a causal influence that goes in opposite directions, or a reversible process" (141). Here, we find the very law of dynamics that conveys dynamic co-construction is figured in language through a chiasmic figure that is also dynamic and co-constructing.

This notion of dynamic co-construction through chiasmus can be found throughout literary and religious studies of chiasmus. For example, Henry David Thoreau's use of chiasmus creates a pattern that is balanced but mutually dependent relation between the individual and social or natural forces (Kopley). In his analysis of chiasmus in the Old Testament of the Christian bible, Nils Lund describes the Hebrew chiasmus as two parallel ladders. This extended chiasmus (sometimes whole chapters) creates dynamic processes of reading that lead towards a climax in the center and then descended (132-136). Thomas Mermall, in his literary analysis of Unamuno, finds that the figure allows Unamuno "to avoid closure, sustain tension, dissociate terms, undermine identities, generate perpetual contradiction, and affirm the eternal struggles" (246). These rhetorical, literary, and biblical scholars all understand chiasmus in terms of

dynamic co-construction that, many times, connects material and discourse on the page. In addition, I have used feminist theory as well as rhetorical theory to apply chiasmus as a heuristic for figuring relations between bodies and discourse in and outside of texts, specifically in this dissertation in Alan Turing's technical writing. In order to make this shift from chiasmus within text to chiasmus between bodies and discourse, I will again draw from Judith Butler and other gender theorists who discuss chiasmus or use chiasmic figures in their theories.

For Butler, bodies and language are “perpetually negotiated” (38). They are always in a chiasmic relation that is intersecting, never subsumed into each other, and dynamically co-constructing. It is in this complex performance and re-performed negotiation that the dynamic characteristic of chiasmus is of crucial importance. The relation between bodies and language is one of constant chiasmic negotiation allows feminists and scholars of bodies to move beyond essentialist notions of bodies. Instead, we are able to theorize gender with a “a notion of matter, not as a site or surface, but as a process of materialization that stabilizes over time to produce the effects of boundary, fixity, and surface we call matter” (xviii). Because bodies are always in this “process of materialization” in relation with discourse, the chiasmic relation that I am describing must constantly be described and re-described. This figure can never be stable or solid. Rather, bodies and discourse are always dynamically changing, reacting and producing in relation to each other.

While this chiasmic relation can be productive—they construct bodies in knowable, recognizable subjects—this relation disciplines and normalizes so that through

performance over and over again, subjects are disciplined into conforming to norms for sexuality and gender. These chiasmic relations are how bodies come to matter in knowable ways. This is a construction through power relations so that “the recasting of the matter of bodies as the effects of a dynamic of power, such that the matter of bodies will be indissociable from the regulatory norms that govern their materialization and the significance of those material effects” (Butler 2). She writes that the materializing effects of discourse are restricted by the “historicity of discourse” (138). That discursive performativity of material effects “does not mean that *any* action is possible on the basis of a discursive effect. On the contrary, certain reiterative chains of discursive production are barely legible as reiterations, for the effects have materialized are those without which no bearing in discourse can be taken” (138). In this way, discourse’s historicity ossifies material effects through “reiterative chains of discursive production.” Thought chiasmicly, these reiterative chains of discourse produce bodies that, in large part, conform to naturalized material forms, like sex, that become invisible. However, by paying attention to the material discursive interactions, Butler is able to make those formally invisible effects not only visible, but also demonstrates their instability.

Dynamics of Biopolitics

We can draw on Foucault’s theories of sexuality in order to interpret some of the technologies that enacted power on Turing’s body and how those relate to Turing’s own thinking on machine bodies and machine intelligence. Although Foucault does not discuss chiasmus, his work here is crucial because it explains the larger historical,

discursive, political, and social mechanism and practices that compose bodies an intelligible and normalized. Discourses construct and reconstruct his identity as a homosexual man represented and articulated within the history to computer science and computer technology and intersecting with practices that produce knowledge. In other words, Turing as a thinker, inventor, and writer cannot be understood as separate or distinct from Turing as a man who identified as homosexual. Sedgwick makes this claim most specific when she opens *Epistemology of the Closet* with the assertion, “an understanding of virtually any aspect of modern Western culture must be, not merely incomplete, but damaged in its central substance to the degree that it does not incorporate a critical analysis of modern homo/heterosexual definition” (1). This is not to say that Turing’s inventions and theories are reducible or explainable as products of a queer sexuality (although this is what Lassègue attempts to posit in “What Kind of Turing Test did Turing Have in Mind”). Rather, sexuality and knowledge production are both co-constructed through a complex network of practices, institutions, and power relations.

Butler explains in her preface to *Bodies that Matter* that her efforts to talk about sexuality always bring her into talking about other things (ix). As much as she tried to focus her thought on bodies themselves, she found “not only did bodies tend to indicate a world beyond themselves, but this movement beyond their own boundaries... appeared to be quite central to what bodies “are” ” (ix). For instance, scholars slide from sexuality to punishment and trauma by mentioning Turing’s sexuality only in connection with his death (Copeland). When scholars frame Turing’s sexuality as an identity category, they do more than name his subjectivity and sexuality; they also frame his identity as

constituted and knowable, in part, by a set of presumed activities, values, characteristics, and established knowledge about those activities (Leavitt).

However, this difficulty is exactly the richness that makes the study of sexuality a high stakes pursuit. Because of these intricate relations between knowledge production and sexuality, attention to Turing's sexuality as well as the material-discursive construction of his multiple subjectivities, inform how we understand Turing's thinking as well as his notions of machine intelligence. On the other hand, Turing's education, the values of the systems of knowledge production in which he contributed, and the power of those institutions all construct Turing as a subject in relation to sexuality, governance, and technology. To explicate this point I will discuss Turing's embodied experiences as informed by Foucault's theories of biopower.

First, I need to define what I mean by sexuality. Foucault's *History of Sexuality* traces the construction sexuality as a category that identifies people and with which people can identify themselves. This category is a construction between power-knowledge-pleasure (11). For Foucault, it is very important that the act of sex not be separated or defined as more natural or real than the category of sexuality. To separate the two would leave the act of sex potentially in the natural or authentic definition with sexuality as a construction of power and knowledge. The act of sex is no less socially constructed notion than sexuality. This is because ““sex” made it possible to group together, in artificial unity, anatomical elements, biological functions, conducts, sensations, and pleasures, and it enabled one to make use of this fictitious unity as a causal principle” (154). Together, this grouping of different actions, things, and

experiences were given the status of a natural and universal concept. Based on this notion of sex, the concept of sexuality seems to causally rise: “sex...is doubtless but an ideal point made necessary by the deployment of sexuality and its operations... Sex is the most speculative, most ideal, and most internal element in a deployment of sexuality organized by power in its grip on bodies and their materiality, their forces, energies, sensations, and pleasures” (155). The categories themselves do not simply regulate and normalize identities. Rather, sex as an act is also embedded in power relations that deploy sexuality. In this way, the category and the embodied act are always connected and producing each other. Regarding Turing’s embodied sexual acts and sexuality, I know and therefore can say relatively little about the particular practices of pleasure. These practices are not necessary to know in order to understand Turing’s sexuality because this project is not interested in defining or dissecting Turing’s sexual practices. Instead, this project is interested in Turing as a homosexual subject as constructed within and against normalizing practices that are historical, social, material, and discursive.

While Foucault is a central theorist in this dissertation and his scholarship informs my reading of the construction of Turing’s embodied experiences, his work has been critiqued for lacking the particularity of unique bodies, especially by Michel de Certeau (*Practices of Everyday Life*), Nancy Fraser (*Unruly Practices* pg 55-66), and Katherine Hayles (*How We Became Posthuman* pg 194-199). Foucault discusses institutions, general practices, and bodily characters that are produced and normalized through biopower. However, with this focus on historical and social trends, his work erases bodily particularity. As Hayles argues, that bodily particularity is crucial for understanding how

particular bodies resist, twist, and alter bodily codes. In particular, for Hayles particular bodies and particular technologies interact to affect each other through practices. She writes, “Formed by technology at the same time that [embodied practices] create technology, embodiment mediates between technology and discourse by creating new experiential frameworks that serve as boundary markers for the creation of corresponding discursive systems” (205).

Considering Turing’s particular body as well his particular writing in “Intelligent Machinery,” we find that the systems that discipline and normalize his particular experience are dynamically re-inscribed into the training and construction of machine intelligence. This adds the richness of particular experience to the larger normalizing effects of biopower. In this way, Turing’s description of the machine he would invent, program, and train to be intelligent reflects and reproduces Turing’s own education, embodied experiences, and therefore his understanding of his own mind and body. In order to invent these notions of machine intelligence, Turing had to already understand himself in somewhat mechanical terms.

Dynamic Production of Sexuality

Like all bodies, Turing is composed through this dynamic, productive process of interaction. In this way, not only does chiasmic rhetoric move to intersect bodies and discourse, chiasmic rhetoric also dynamically produces both bodies and rhetoric. Turing’s body is produced within a particular historical, social, and political context. I cannot unpack all of these levels of interaction, but this chapter will begin to address the

composing of Turing's body especially his body as a subject with sexual and national identities.

Turing, in some ways, is a queer figure. He is a gay man. But in many ways he conforms to normative standards for men of his social status. By in large, after his college years at Cambridge, Turing revealed his private life to a very small set of individuals. Primarily he was a private man, especially private about his sexual life. In the entry on Alan Turing in the *Lesbian and Gay Studies Reader*, Barbone states, "Turing's place in homosexual studies is problematic because he neither hid nor proclaimed his sexuality and would likely wonder why it might concern anyone anyway. Perhaps his own inability to grasp why his sexuality should be of interest to others is what makes his an enigma both to those in and out of gay studies" (594). And this is likely more complicated by Barbone's suggestion that Turing was "neither in nor out of the closet and may not even be aware, perhaps, that there was one" (595).

Even in his biographies, Turing's identity as a homosexual man is discussed in ambiguous ways. For instance, immediately after identifying Turing by the stereotype of "an ordinary English homosexual, atheist, mathematician" Hodges writes, "It would not be easy" (115). Here, Hodges highlights that Turing is peculiar in a lot of different ways. Turing's particularity would mean that he does not quite fit or easily move into any clear-cut, dominant identity category. Hodges writes that Turing was an '*ordinary*' English homosexual, atheist, mathematician," but for certain, this could not have been a time worn stereotype. Despite, or perhaps due to this ambiguity, Turing is an interesting figure. Like so many of us, Turing both conforms to and defies normalizing codes that

represent bodies. Unlike so many of us, Turing achieved national and international fame as an genius, became a war hero, was arrested for homosexuality, and was chemically castrated.

Turing in Transition

Alan Turing's life changed considerably between 1936 when he published "On Computable Numbers" and 1948 when he wrote his next major contribution to artificial intelligence, a report, titled "Intelligent Machinery," to the National Physics Laboratory. In 1938¹² the almost-certain world war and Turing's own dissatisfaction with the hoped for mentorship under Alfonzo Church led Turing from Princeton back to Cambridge. But he did not remain in Cambridge long. With the beginning of WWII, he left theoretical mathematics and its location in universities and moved towards mathematical applications and cryptology for the British government at Bletchley Park.

As war with Germany became an ever more likely possibility, the British government needed to expand its intelligence operations. To an unprecedented degree, the British government would need mathematicians, scientists, and engineers to fight this war of information. The German government was encoding messages with the Enigma Machine, which was not a digital computer but was an electronic encoder that could encode information at a level of complexity that, at the time, was undecipherable. This

¹² This is also the year that he completed his dissertation under the mentorship of Alfonzo Church at Princeton. Turing theorized what he called an O-machine "a new kind of machine." This O-machine would be different from his universal Turing Machine that he proposed in 1937. The O-machine contained a random 'oracle' or black box that would insert a random figure that is not calculable by a standard Turing machine.

machine was the “central problem that confronted British Intelligence in 1938” (Hodges 148). Turing was a “natural recruit” according to Hodges: Turing was a mathematician with experience solving complex mathematical problems with the help of electronic machines (148). While most men were enlisting in the British army and leaving for the battlefield, Turing joined a group of elite scientists and engineers in the British Government Code and Cipher School and left for the countryside at Bletchley Park.

Although many men and women worked in the US and America to advance mathematics and computer technology during WWII, Turing’s particular contributions earned him some fame and recognition for his creativity and his ability to think in flexible ways (Leavitt 8). Turing played a central role designing many of the computers and techniques for decoding and encoding messages, including the ‘bombe,’ which intercepted and decoded messages in order to locate the German U-boats (Copeland *The Essential Turing* 2). He also designed a computer he named Delilah, which used random noise to encode messages. British historian and veteran of Bletchley Park, Sir Harry Hinsley, suggests that the work done at Bletchley Park reduced the length of the war by as much as two years. Likewise, Copeland argues that Turing’s contributions towards computing and cryptology made a significant impact on the course of WWII (Copeland “Turing After the UTM” 493). A fellow cryptologist wrote after Turing’s death: “I won’t say that what Turing did made us win the war, but I daresay we might have lost it without him” (in McCorduck *Machines Who Think* 53). British Lord Chancellor Chris Grayling, when he announced Turing’s pardon on Christmas Eve 2013, even called Turing “a war hero like Winston Churchill.” Many of these accolades were reconstructed after Turing’s

death. During his life, he received some prominence during the war, but he floundered some outside of Bletchley Park's selective, protective social circle.

Turing wrote "Intelligent Machinery" in 1948 at a time of social transition that caught his career at a moment of uncertainty. Turing was offered a prestigious position with the National Physics Laboratory in 1946, and he set to work designing and building a general-purpose, digital computer, the ACE machine. During the war his superiors gave Turing the latitude to execute his unconventional methods because they produced results. These included methods by intuition, random selection, "sheer bloody guesswork, guessing and hoping" (Hodges 185). After the war, however, Turing's superiors and colleagues questioned his peculiar methods. The ACE machine was one particular sticking point. The British officials decided to follow Von Neumann's design. This decision was indicative of the general recognition that the United States was the world leader in computer technology (Rees 611). Turing's ACE machine was being built, but not in the way that Turing designed (Copland *Essential Turing* 398-399). Max Newman showed up yet again to offer a new opportunity for Turing. Newman founded the Royal Society Computing Machine Laboratory at University of Manchester and offered Turing the position of Deputy director. This position offered Turing flexibility and intellectual freedom. Turing asked for a one year sabbatical but soon broke what Director of the NPL Sir Charles Darwin referred to as a "gentleman's promise" to return after the sabbatical (Copland 400). By May 1948, Turing submitted his resignation to NPL and began working at the University of Manchester.

Biographies Constructing Sexuality

Of course, I am not the first to discuss Turing's sexuality. With each new biography and each new account of Turing's contribution to computer science, scholars discursively reconstruct Turing's sexuality. By in large, Turing's sexuality is exclusively discussed in biographical work on Turing, not theoretical or scientific discussions¹³. For instance, although Copeland has worked for years to petition an official pardon for Turing's crime of 'indecent' (see Copeland, "Pardon the Digital Warrior?"), he makes no mention of Turing's sexuality in his most extensive text on Turing *The Essential Turing*. In these cases, Turing's sexuality is excluded within the context of Turing's intellectual work. This silence also suggests that the field itself is free of or objective to sexuality. In logical mathematics in particular, any subjective, personal, or even material connections are excluded. When scholars focus on Turing's theories they exclude any mention of Turing's sexuality. Leavitt also notes this trend: "most popular accounts of his work either fail to mention his homosexuality altogether or present it as a distasteful and ultimately tragic blot on an otherwise stellar career" (6). If his sexuality is mentioned, this is often a passing mention of the tragic circumstances of his sentencing of crimes of indecency, chemical castration, and his death.

Jean Lassègue posits the most explicit connection between Turing's sexuality and his thinking in "What Kind of Test Did Turing Have in Mind." Lassègue seeks to answer the question "is the so-called "Turing test" as objective and scientific as it is claimed to

¹³ Some of the many publications on Turing that make no mention of his personal life or sexuality include: Bolter, *Turing's Man*; Copeland, *Essential Turing*; Dyson, *Turing's Cathedral*.

be in the AI and cognitive science community?” with a resounding and final “no” (2). And his reason for rejecting Turing’s scientific theories is due almost exclusively to homophobic justifications. Instead, Lassègue argues that the “test says in fact more about Turing’s psychological life than about the science of the mind itself” (2). Lassègue links Turing’s homosexuality with a possible traumatic memory of his circumcision: “circumcision may be interpreted as a wound on the skin... and it may result in the same creative function in Turing’s mind” (11). While the circumcision is the wound that Turing supposedly mourns, his particular design of the Turing machine, with tape that is read step-by-step from side-to-side is also symbolic of the cutting of the foreskin. Lassègue lays out this argument:

The function of the tape itself would be to recollect the lost integrity of Turing’s body burnt in the circumcision in the stepwise procedure of a temporal succession. From this point of view, the tape would represent the now missing integrity of the body and more specifically the lost skin itself. As to the stepwise procedure itself, it would represent the specific way Turing found to save his hide. (12)

Lassègue pathologizes homosexuality by explaining its cause as a wound and trauma. Furthermore, he presumes that Turing’s driving ambition in his inventive life was to subconsciously ‘save his hide’ by reversing or healing the wound. Any possible personal motivation or repressed (as Lassègue acknowledges that this is repressed) trauma related to homosexuality are serious enough infractions of the ‘objectivity’ of knowledge that Turing’s contributions must say nothing about computing or artificial intelligence and

instead only tell us about Turing's personal life. Despite the homophobic overtones, Lassègue's argument was received unproblematically and without critique within science and technology studies and histories of technology¹⁴.

Both Hodges and Leavitt discuss Turing's sexuality in a way that is complex and productive. Andrew Hodges' biography of Turing, *Alan Turing: The Enigma*, offers the most detailed representation of Turing's sexuality. In particular, Hodges integrates Turing's personal life in a way that shows its relevance or significance for understanding his thinking. As his title suggests, Hodges' biography not merely to collect facts on Turing, but also to solve the enigma that is this influential thinker. Steven Barbone reads this book as a collection of influences, facts, situations, and limitations that together inform why and how Turing may have died. Connecting Turing's theories and his life addresses the enigma behind his death because "the solution lies not in any one fact, but in the whole pattern that led up to the event [of his death]" (Barbone 594).

Leavitt's *The Man Who Knew Too Much* also offers a complex account of Turing's sexuality. Turing's assumption that homosexuality is "nothing at all *wrong*," for Leavitt, reflects his "startlingly original—and startlingly literal—nature of his imagination" (6). He also sees a connection between Turing's sexuality and his claim that machines may also have a form of intelligence. He finds, "after all, his insistence on questioning humankind's exclusive claim to the faculty of thought had... encoded a subtle critique of social norms that denied to another population—that of homosexual

¹⁴ See Leavitt *The Man Who Knew Too Much*, Wilson *Affect and Artificial Intelligence*; Moor *The Turing Test: The Elusive Standard of Artificial Intelligence*, Saygin et al "Turing Test: 50 Years Later

men and women—the right to a legitimate and legal existence” (5). His goal, as he explicitly states it, is to write a biography of Turing to repair or revise the representation of Turing as a homosexual man (6). Both of these accounts are important contributions. I will build on Hodges and Leavitt’s accounts of Turing’s biography and read within the context of Foucault’s theories of biopower, in order to show the ways that Turing’s own embodied experiences being disciplined also inform his own writing and invention.

In the chiasmic relation between bodies and discourse that I have been theorizing, both sex and sexuality are embodied and discursive performances. Like all of us, Turing’s body and his discourses are both shot through with practices of sex and sexuality. All of these mechanisms for producing subjects are disciplining as well as productive: these produce bodies as knowable subjects and also produce new knowledge. We can find traces of these disciplining norms in both Turing’s biography and in Turing’s writing on artificial intelligence. I will focus this on two primary concerns: norming through intervention and a targeted focus on bodies.

Machines in Transition

In these years between Turing’s proposal of a universal Turing machine and his arguments for intelligent machinery, computer technology advanced rapidly due, in large part, to meet the increasingly technological face of warfare in WWII. In her first-hand account of the rise of mathematics for application into computers, Rees writes:

although automatically sequenced electronic computers were not available before the end of the war, the needs of the war played a decisive role in their initial

development and the military services continued their interest and provided much of their financing of the post-war developments. (610)

With considerable investment from both the British and American governments, computer technology saw its first official birth immediately after WWII. It would still be another 2 years before a fully digital, stored memory computer would be patented, and that would happen in the United States.

Scholars have hotly debated the exact birth date and the particular inventor of the first computer. By most American accounts, the Electronic Numerical Integrator and Computer (ENIAC) in the Ballistic Research Lab in Maryland the first electronic, general purpose, stored-programming, digital computer (Haig; Dyson). John Mauchly and J. Presper Eckert are credited as the primary inventors who had the machine fully functional by 1946. Jon Von Neumann is also an important inventor who put the ENIAC to work towards one of its first major tasks: calculating the viability of the Hydrogen bomb. While the ENIAC most closely functioned as a blueprint for the modern computer, many engineers and mathematicians were developing computing technology in America and England. From a British perspective, the Colossus is claimed to be the first fully programmed digital computer. This was designed in part by Turing's long time mentor and friend, Max Newman, during WWII at Bletchley Park. Although Turing did not work primarily with the Colossus, he was a lead cryptologist and mathematician at Bletchley Park at the time. Agar documents many universal machines that were developed concurrently in the US, England, and in Europe (*Turing and the Universal Machine*). At the same time, he defines the first fully functional computer at University of Manchester

in operation by 1949. Turing wrote the computer manual for this machine, which the technicians called the Blue Pig (*Turing* 121-2).

In general, the fields of computer science and mathematics were in a state of dynamic flux. Many computers existed that functioned, in part, as digital, universal machines. What is more, all of these machines were designed, built and functioned in very different ways. Turing's ACE machine probably required the most *physical* legwork, which very much reflects Turing's own physicality and exercise routine. The operators had to literally run from one tightly packed room of equipment into another in order to input instructions from one machine to another. Scientists, theorists, and mathematicians, including von Neumann and Norbert Weiner, were gathering at the Macy Conferences, which were annual meetings on cybernetics and information theory from 1943-1954. It is in these foundational meetings that the fields of cybernetics and computer science were beginning to take shape.

Transitioning Technologies to Transitioning Bodies

In *How We Became Posthuman* Hayles traces the Macy Conferences discourses during this time of dynamic change in order to trace the emergence of a materially neutral notion of information. At this time, it was not obvious or agreed upon that information should be understood as separate from material. A notion of information or data that was somehow transcendent or indifferent to material was developed "not because it had no opposition but because of scientifically and culturally situated debates made it seem a better choice than the alternatives" (50). Through the Macy Conventions, these founders of cybernetics

gradually settled on a notion of information that was defined as separate from material substance. Thus, it is through these discourses that the founders of cybernetics reinscribe the antithesis between bodies and minds, material and information. Information is free and indifferent from material or media that may serve as its temporary container.

One of the effects of this notion of immaterial information is that material came to be thought of as dynamically and endlessly pliable and passive. Wiener draws emerging digital computation to develop cybernetic theories of altering human bodies. In making this shift, he tacitly assumes that human bodies are endlessly pliable and needing to be change. Especially for Wiener, these passive bodies needed constant improvement, alterations, and additions in order to better human thought as well as human physical capabilities. Again, Wiener presupposes antithesis between bodies and minds. And he does so to a relatively extreme level: he imagines leaving bodies behind entirely by uploading human minds into computers.

For Hayles, posthumanism includes a notion of humanity that can and should be pushed or 'enhanced' beyond our 'natural' bodies in the service of advancing technology. This is a posthuman attribute in which bodies are "the original prostheses we all learn to manipulate, so that extending or replacing the body with other prostheses becomes a continuation of a process that began before we were born" (3). Hayles demystifies this notion of information free of particular media and material by tracing the discourses and inventions that separate information from its material form. Hayles also shows that information must necessarily have a material form. In this way, Hayles identifies media bodies as always intersecting with information and mind. Although she does not call

these chiasmic relations, her work establishes the ways that bodies and information dynamically interact, especially how those interactions change with changing technologies.

Turing never attended the Macy Conferences, but he was certainly associated with conversations. He corresponded with and studied with the most prominent members of these conferences: Weiner and Von Neumann (Hodges 117-8 402-3). Turing also directly addresses, at length, the kind of body and the role of bodies in constructing intelligent machinery. Like the discourses of the Macy Conferences, “Intelligent Machinery” contributes toward shifting discourses on the relation between bodies and technologies. However, Turing does not articulate an immaterial notion of information. Rather, this is a notable text because intelligence and embodiment dynamically interact. “Intelligent Machinery” not only addresses how Turing understands a complex, dynamic relation between material and information (as Hayles would predict), but also reveals how Turing’s own embodied experiences informed his arguments for intelligent machinery.

First Manifesto on Artificial Intelligence: “Intelligent Machinery”

In June 1948, Turing wrote “Intelligent Machinery,” which was his final report to the National Physical Laboratory. Copeland describes this article as “far-sighted” and “strikingly original,” which is significant because it “brilliantly introduced many of the concepts that were later to become central in [Artificial Intelligence]” (401). Copeland calls this article the first manifesto of artificial intelligence. Copeland’s praise aside, the article originally was received with disappointment. NPL director Sir Einstein described

this article as a “schoolboy’s essay” that was “not suitable for publication” (in Copeland *Essential Turing* 401).

I focus on this article because Turing first articulates his thinking on machine intelligence. This article is a detailed and very imaginative exposition of defining and producing intelligence. “Intelligent Machinery” is also significant because Turing composes this at a time in which Turing’s thinking and also computing technology are in a time of dynamic flux. In this way, Turing is ‘trying out’ ideas for the first time and in his working these ideas out we find unusual notions of machine embodiment. Most significantly, Turing’s chiasmic rhetoric in “Intelligent Machinery” posits notions of intelligence and body in ways that are thoroughly integrated and even dynamic. Turing directly addresses the question of what or how our machine intelligence may be embodied.

In “Intelligent Machinery,” Turing composes dynamic, chiasmic interactions between bodies and intelligence and these interactions are primarily composed through a discipline that focuses on the body of the machine. He opens: I propose to investigate the question as to whether it is possible for machinery to show intelligent behavior” (410). After acknowledging and refuting several objections, he proposes an unorganized machine, which he compares to the blank slate brain of a human child. This machine would have potential networks of connections or pathways. However, the machine would learn through ‘pleasure’ and ‘pain’ to continue using the correct pathways and stop using the incorrect pathways. This, according to Turing’s view, is a replication of how humans develop intelligence. His primary claim for making machines intelligent is that a machine

could be built like a man: “a great positive reason for believing in the possibility of making thinking machinery is the fact that it is possible to make machinery to imitate any small part of man” (420).

As this logic goes, given that we can build mechanical replicas of some body parts, then we may also one day be able to replicate human thought. In order to develop towards intelligence, just like raising human children, the machinery would have to be ‘raised’ in environments with training particular to complete more simple tasks and not expected to master complex human thought. This ‘raising’ of intelligent machinery is a process of programming the machine to follow different practices, gradually learning from the dynamic, iterative practice.

“Failures” of Turing’s Technical Writing

Turing wrote this article with the supposed intention of submitting it as a technical report summarizing and concluding Turing’s research from the past year. In some ways, this article does contain some of the typical markers of technical writing. Turing opens by defining machinery and separating it into distinct categories, only one of which he will address. In each section, Turing begins by setting out the categories of a particular concept and then defining exactly what he will focus on. Each time he introduces a new term, whether a neologism or a technical term, he always defines its meaning, even if that definition is then followed by qualifiers like “this does not pretend to be an accurate term. It is conceivable that the same machine might be regarded by one man as organized and by another as unorganized” (416). Turing reveals that, although this article has some

appearances of technical writing, in many ways his writing “does not pretend to be” a fastidious example of technical writing. This is partially because his rhetorical choices do not conform to standards. Most strikingly, this failure to meet the expectations of good technical writing is, in part, due to his tendency to thinking in terms of embodiment. This defies the basic standard to write objectively. His primary audience was the National Physics Lab, who expected this report to include concrete findings from Turing’s year of sabbatical research. In this expectation, they would certainly be disappointed.

“Intelligent Machinery” exhibits much of the rhetorical bravado of a manifesto. Regarding the content of his writing, his claims are based on future hypotheticals not on any current, material technology. The hypotheses found in this article are unusual for scientific or technical writing, to say the least. For instance, he imagines a group of all male scientists raising this machine like a baby. His suggestion of re-making the human body out of mechanical parts is a familiar, though strange, revision of Dr. Frankenstein’s monster. Also like Dr. Frankenstein, he even calls the intelligent machine a “creature” in the report (420). He describes creating a human-like body with mechanical parts and then worries that if the machine were allowed to roam it would frighten citizens (420). This level of imaginative and hypothetical writing breaks even the most loose of conventions within professional, technical, and scientific discourses.

Further, stylistically, Turing’s style often lacks the specificity and modal qualifiers that often define good scientific and technical writing. Instead, Turing makes sweeping, broad claims about what future machines may be able to do and their impact on society. He even calls attention to the vague quality of this style several times by

acknowledging, “This definition is probably too vague and general to be very helpful” (425). This article does not conform to any particular expected form of technical report. What is especially unusual is that Turing opens with possible objections to mechanical intelligence before he even describes how the machine would be built or programmed. Again, we find in this article that Turing fails to conform to technical writing standards in nearly every way.

Although many of the choices he makes, his conclusions, his examples, all seem strange or out of the ordinary from the standpoint of technical writing or science and technology studies, I will demonstrate that all of these strange aspects of the article can be explained given a dynamic, chiasmic relation between Turing’s embodied experiences and his writing and thinking. The co-construction between Turing’s body and Turing’s thinking share a similar emphasis on discipline and normalizing. Through an analysis of Turing’s proposed design for training intelligent machinery and informed by Foucault’s concept of biopower, I will show the dynamic co-construction between Turing’s embodied experiences and the knowledge he composed in “Intelligent Machinery.”

Sexuality That Produces Knowledge

Michel Foucault’s *History of Sexuality* has long shifted our thinking on discourses of sexuality away from a repressive hypothesis that needs to be liberated with more discourse on sex and sexuality, to more analysis of the productive discourses around bodies and sexuality, in order to understand how these discourses construct, discipline and normalize subjects. As mentioned, Leavitt’s biography is an example of a text that

continues to assert that there is a repressive stance towards discourses on Turing's sexuality. In addition, Leavitt's goal is in a way to resist that supposed repression with more discourse on sexuality. He states that his goal in *The Man Who Knew Too Much* is to counter the repression of discourses on Turing's sexuality by including more discussion and connections to Turing's sexuality (4).

In *History of Sexuality*, Foucault traces the material and discursive contingent histories that establish western societal norms and have developed practices that intervene on bodies in order to normalize them. In Foucault's account, Western, technologic, liberal society is a normalizing society¹⁵. Later, I will demonstrate places in Turing's biography that conform to much of the normalizing society that Foucault describes. This normalizing society, which means a society in which the individual people are socialized into conforming to an ideal norm and evaluated by their relative approximation to that ideal norm, is the "historical outcome of a technology of power centered on life"¹⁶ (144). People become normalized through technologies of power. We see in this quick analysis of "Intelligent Machinery" that Turing resisted conventions.

Technologies of power are institutions and practices that are dispersed, shared, enacted, and negotiated constantly. This notion of power is not administered or held by a single person: this is not a unilateral, intentional holder of power. Instead, for Foucault, technologies of power can best be understood as processes, relationships, and

¹⁵ In his later lectures on governmentality he will argue that neoliberalism alters the practices of normalization so that that the practices under neo-liberalism differ from the practices found in the panoptic society described in *Discipline and Punish*.

¹⁶ Technologies of power focused on death would include the public, symbolic interference (torture and death) on the human body that Foucault describes as a political operation used by the sovereign power (*Discipline and Punish* 53).

performances and not a thing that one either has or does not have. Power is enacted not possessed. These can include literal technologies like computers and also social, economic, and political systems. Likewise discipline is not exclusively through the very public and brutal forms of disciplining. A whole complex set of institutions and practices must already be in place and ready to intervene on human life. These institutions and practices include laws that define norms and institutions that regulate life to fit into norms, including scientists who at the time studied hormones in order to establish how to correct deviant sexualities and genders and schools that define processes of acceptable knowledge production. These institutions regulate life to define norms, discipline bodies to become productive parts of economies, and regulate populations in ordered and controlled ways. While these forms of intervention discipline bodies in many different ways, sex is an especially effective location of intervention. Foucault explains that this is because “sex was a means of access both to the life of the body and the life of the species” and “at the juncture of the “body” and the “population,” sex became a crucial target of a power organized around the management of life rather than the menace of death” (146-7).

I will focus on how two main elements—interference and a focus on the body—that Foucault describes as the normalizing practices. I will also connect these to Turing’s text and his biography in order to demonstrate that the normalizing practices that Foucault describes also shaped Alan Turing as a sexual subject and these same practices reemerge in this foundational text on artificial intelligence. In particular, I find the

chiasmic relationship as a dynamic one in which discourse and bodies intersect to produce Turing as a subject of sexuality and also shape his knowledge production.

Analysis of Intelligent Machines and Biopower

Foucault identifies the work of biopower on bodies as a process of interfering with bodies and populations to regulate towards a norm. This interference comes in a few different forms. Obviously, laws can be seen as interference and disciplining, as in the case of Turing's sentence to prison or chemical castration. Instead of laws prohibiting or restricting dangerous behavior, laws are also used to protect or regulate populations towards a norm. In particular, Foucault traces the move towards laws that focus on the life of the state and population. Although Foucault does not discuss England's anti-homosexuality laws, this is an egregious example of the state using laws to regulate the population by focusing on the sexual life of individual men and the general population. But Foucault demonstrates that laws are not the most prevalent or the most effective forms of interfering on the life of the population. He also finds these interferences in organizations of space and bodies, including "schooling, the politics of housing, public hygiene, institutions of relief and insurance, the general medicalization of the population, in short, an entire administrative and technical machinery" (126).

These interfering practices on bodies can be found to work on the level of the population and on the individual. Regarding the population, this operates through laws as well as through education reform and statistics. Biopower, which focuses on sex and sexuality of populations, "gave rise as well to comprehensive measures, statistical

assessments, and interventions aimed at the entire social body or at groups taken as a whole” (146). Through these different institutions and technologies, the state produces knowledge about populations in order to apply that knowledge towards intervening on the life of the population.

In addition to this generalized mode of producing knowledge and regulating populations, Foucault also describes more individually targeted forms of intervention on bodies. This is far more dispersed form of biopower. In addition, this form of power, like that of the population, focuses on the on bodies. For examples, while birth controls and laws banning homosexuality operate on populations generally, the diagnosis, treatment, and monitoring to hysterical women is more individually focused form of intervening on women’s bodies. The individual woman was disciplined and regulated for the “health of their children, the solidity of the family institution, and the safeguarding of society” (147). In this case, “the intervention was regulatory in nature, but it had to rely on the demand for individual disciplines and constraints (dressages)” (147). These interventions regulate and normalize chiasmic relations between bodies and discourses.

Interference on Machinery

Interference is also a key concept for Turing in his conception of artificial intelligence in “Intelligent Machinery.” In this article, Turing uses the term interference to describe his a mode of disciplining machines towards intelligence, which is a productive form of disciplining, through dynamic changes, additions, alterations, and influences on the instructions and the hardware of the computer. This is necessary because, if a machine is

going to demonstrate intelligence, it must be able to learn. Turing's describes his understanding of the human intelligence by writing, "We may say that in so far as a man is a machine he is one that is subject to very much interference. In fact interference will be the rule rather than the exception" (421). And he defines this interference as first a man's education and teachers, and also as "frequent communication with other men, and it is continually receiving visual and other stimuli which themselves constitute a form of interference" (421). In order to get a machine to learn and develop towards intelligence, Turing devised a system of educating machines through interference. Turing proposes: "if we now consider interference, we should say that each time interference occurs the machine is probably changed. It is in this sense that interference 'modifies' a machine" (419). Regarding the hardware, a machine would be designed with relatively few established connections or pathways but many possible pathways. This, by analogy, would be like a child's brain, a blank slate. In order to create the connections, pathways, and systems of processing problem solving, the engineer or scientists would need to interfere. Turing outlines a few specific details about what this interference for educating intelligent machinery.

First, in "Intelligent Machinery," for Turing interference would be limited to two kinds: "one for 'pleasure' or 'reward' and the other for 'pain' or 'punishment'" (425). By referring to the process of interfering as pleasure and pain, Turing creates an analogy with human experience. He compares this to how children are raised with systems of rewards and punishments (428). The computer would be made to feel pleasure by finding a solution and establishing a system of thought. A machine would be made to feel pain by

shutting down a path or connection that led into infinite loops or no solution. Through “judiciously operated by the ‘teacher,’ one may hope that the ‘character’ will converge towards the one desired, i.e., that wrong behavior will tend to become rare” (425). Turing imagines gradual, iterative, interventions not onto the machine’s mechanical makeup but the machine’s performance of tasks. In this way, Turing demonstrates that he considers the construction of intelligence not to be an innate quality or a set of instructions. Rather, intelligence and thinking are produced through iterative practices and through socially constructed interferences of pleasure and pain that guide Turing’s childlike machine towards the ‘correct’ way of operating intelligently. That is, intelligence and thinking are produced chiasmically.

We also find that Turing’s intelligent machinery needed two other things for intelligence: experience and social context. Regarding experience, it is only through doing problems, feeling pleasure or pain, creating and shutting down connects, that this hypothetical machine becomes intelligent. He writes that, “it would be quite unfair to expect a machine straight from the factory to compete on equal terms with a university graduate... This contact [with human beings] has throughout that period been modifying his behavior pattern” (421). A new machine’s intelligence is more like a new human infant: it would need experiences in order to become intelligence.

Machine intelligence would develop socially. He seems to be musing when he suggests that the machine would ‘go to school’ within the labs led by engineers and scientists as teachers (425). Turing describes a hypothetical social space, which also resembles his actual social space: a place of all men working together to ‘raise’ an

intelligent machine. And that is exactly how Turing and his colleagues imagined their inventive, technical work. The computer he worked on while at University of Manchester was called the ‘baby machine’ (Hodges 394, Leavitt 231). Each of the technicians and also the interactions with other machines would ‘socialize’ these machines to learn new tasks, solve new problems, and gradually even learn to use language, play games, and possibly even write creatively. These interventions, both on Turing’s body and the Turing machine, focus directly on bodies in order to produce dynamic intelligence and knowledge.

Focus on Dynamic Bodies

Foucault demonstrates that disciplining norms are regulated through a particularly intent focus on bodies, those of individuals and populations. Foucault traces how “deployments of power are directly connected to the body—to bodies, functions, physiological processes, sensations, and pleasures” (151). Throughout his work, Foucault traces changes, transitions, and histories. But what doesn’t seem to change is that there is a focus on the material body. However, this focus on bodies is always connected to and dynamically intersecting with discourses. And as the discourses change, so to do bodily practices, bodily norms, and bodily pleasures and pain change.

In *History of Sexuality*, institutions and practices all regulate and produce knowledge about bodies, including organizations of “schooling, the politics of housing, public hygiene, institutions of relief and insurance, the general medicalization of the population” (126). These material-discursive practices interfere with bodies by

disciplining and regulating how bodies are organized in space, instructing and training for “good” behavior, and by producing and distributing knowledge regarding medicine and health. Discourse and bodies are always connected in Foucault’s analyses. For example, while he is analyzing the construction of the child as a sexual subject, he is also analyzing the physical construction of spaces and the practices of observing and disciplining children (104). Throughout his work, discourses and material dynamically influence each other. Discourse slides into material bodies and bodies slide into discourse.

Disciplining Machine to Discipline Knowledge

Turing’s program for educating and training his computer reflects many of the trends that Foucault describes at the time including an intent focus on the ‘body’ of the machine. Turing’s descriptions of intelligent machinery resonate in some ways with Foucault’s description of the power over life. In particular, Foucault describes biopower as “centered on the body as a machine: its disciplining, the optimization of its capabilities... all this was ensured by the procedures of power that characterized the *disciplines*” (History of Sexuality 139). However, for Turing the focus on the machine includes the computer’s body as well as the metaphor of the human body that is used to compose Turing’s theory of machine intelligence.

Turing first imagines the possibility of metaphorically reproducing the whole body of a man in order to construct artificial intelligence. This machine body would have eyes and ears: “that the microphone does this for the ear, and the television camera for

the eye are commonplaces” (420). The machine’s body also would need to travel and experience the world in order to know the world.

“one way of setting about our task of building a ‘thinking machine’ would be to take a man as a whole and to try to replace all the parts of him by machinery... this would of course be a tremendous undertaking. The object if produced by present techniques would be of immense size, even if the “brain” part were stationary and controlled the body at a distance. In order that the machine should have a chance of finding things out for itself it should be allowed to roam the countryside, and the danger to the ordinary citizen would be serious” (420).

Like Frankenstein’s creature, Turing acknowledges that this would frighten people. Also, secondarily, this would be impossible or impractical to build. Therefore, Turing limits the body of the intelligent machinery to just the brain: “Instead we propose to try and see what can be done with a “brain” which is more or less without a body” (420).

Although in the end he describes the machine without a replicated human body, he continues to attend to a body of the machine through use of metaphor and also through his attention to the feeling or experience of the machine. At each stage in the computer’s development, he uses a metaphor of human embodiment. This begins with the baby as the blank slate, which is the state at which Turing sees computers at the time of his writing this article. Later he compares the machine to a schoolboy learning through experience. Turing describes machines that would be indistinguishable from a grown human, in particular indistinguishable from a man’s chess playing ability. By the end, Turing compares the computer to a man who has 18 years of experience in the world of men.

In addition, by focusing on pleasure and pain, Turing connects computer intelligences with feeling or experiencing as well as solving and working. In this way, his definition of intelligence requires an attention to bodies. While machines without intelligence would not learn through experience, for intelligent machines the ‘body’ has the ability to feel, respond, and learn from feelings of pain and pleasure. In this way, the particular body of the machine informs its intelligence. Without a human-like body, Turing concedes, the machine could never be very intelligent about most things. In particular, this machine would be drastically limited because “the creature would still have no contact with food, sex, sport and many other things of interest to the human being” (420). Here, Turing does two things: first he affirms that experiences (including sex and sport) inform the knowledge that we produce and he second acknowledges that without these rich set of human experiences a machine would be limited in what it could know.

Given these limited experiences (Turing concluded in “Intelligent Machinery that producing a machine body with full sensory abilities and the ability to travel would be far too complicated.) and limited sociability (all male scientists), Turing acknowledges that the machine would have very limited intelligence. It would only be good for chess, math, and language learning and language translation¹⁷ (420). These four things are achievable for this machine because the tasks are learnable without a human body, without the ability to experience the wider world, and are structured through a set of rules.

¹⁷ As it turns out, machines continue to struggle to learn language. As Agar concludes, “Proficiency in natural language... has broken each new generation of Artificial Intelligence machine” (*Turing* 131)

Regarding the relation between bodies and intelligence, Turing limits what a machine could know to what a machine could experience in an embodied way. Implicitly, this argument for machine intelligence depends on a chiasmic relation and dynamic interaction between the machine experience and the machine's intelligence. Machine intelligence is limited by the lack of bodily experience. Therefore, we find in Turing's work, embodiment shapes and allows for specific kinds of intelligent behavior. Different bodies allow for different experiences. And these different embodied experiences allow for different forms of intelligence. This is not a natural form of knowledge of bodies. Rather, through experience, pleasure and pain, interference, and social construction, knowledge is a factor of embodied experience. Humans know because we have bodies. Given the limited bodies of machinery, their intelligence would be limited to the kind of experiences, which could be constructed for them by machinery, instructions and code, as well as the social context engaging with other machines and scientists. Although the embodied experience of an intelligent machine is highly limited, the significance here is that Turing imagines intelligence as a product or result of experience and intelligence is shaped by the embodied particularity.

Embodying Turing within Intelligent Machinery

Foucault's historically contingent theories of biopower and normalization include the time period in which Turing was raised and the times in which he was writing. Although Turing does not explicitly connect his experience to his proposal for intelligent machinery, parallels between his notion of training a machine and his own embodied

experiences are easy to find. His experiences shape his identity as a subject with sexuality as well as a subject who produces knowledge. These experiences serve as a kind of foundation or analogy for Turing's invention of artificial intelligence. The interference through pleasure and pain that Turing describes as a practice for training intelligent machinery parallels Turing's own education. In particular, his training at prestigious boarding schools involved intense disciplining and even pain. As a child, Turing was sensitive. His brother was sent to a prestigious French school. He wrote back telling Mrs. Turing "for god's sake don't send him here... it will crush the life out of him" (19). At Sherborne School, Turing experienced what Hodges describes as "continuous public scrutiny and control of every individual boy. These were the true priorities" (22). The headmaster stated the goals of this education: "to become familiar with the ideas of authority and obedience, of cooperation and loyalty" (Hodges 22). Agar describes the education at Sherborn: "favoured instead the encouragement of classical languages for the brain, and physical sports, specially rugby and cricket, for the Imperial virtues of manliness, hierarchy, and leadership" (65). His day-to-day routine as well as his physical appearance was strictly regimented (Hodges 23). At Sherborne, Turing learned what it meant to be a man through physical and emotional pain: he was disciplined for untidy behavior and also mocked for his performance in sports.

But Alan Turing also would have learned about what it means to be a scientific man by the pleasures he was afforded throughout his life. In this way, although Turing certainly struggled, he was also afforded a lot of privilege due, in part, to his ability to conform to expectations of an eccentric, introverted young genius. Because he showed an

aptitude for science and math, teachers let him skip out on required social and physical activities to work in the lab (Agar 18-19). He was given a space and time to experiment. By withdrawing into science, Turing was able to find pleasure in work and safety from disciplining. As a scholarly student, Turing could “take on the role of an intelligentsia in the ‘nation in miniature’, tolerated provided [he] interfered with nothing that mattered [i.e. sports and competition]” (Hodges 22). While at Bletchley Park and then later at University of Manchester, Turing was afforded leverage and freedom to be a bit peculiar. People would comment on his strange behavior: locking his coffee cup to his bicycle, showing up to work sweaty after 10-20 miles of running or biking, tying his pants up with a piece of rope. But they still referred to him as ‘the professor’ at Bletchley and Manchester. In Manchester, he was given freedom of what his colleagues called his “creative anarchy” (Hodges 343). This freedom was granted because Turing was seen as an intellectual, which is a role that was respected despite his social oddities.

Turing would have also felt the pleasure from the recognition and approval he gain for his intelligence and single-minded commitment to his work. It is no wonder he at times appeared to have a greater fondness for computers than for people. Turing would have had years of experience negotiating safe and unsafe spaces for gay men. He was relatively open about his sexuality (Leavitt describes him as “naïve, absent-minded, and oblivious” [4]). But in many ways he remained outside of the major social scenes: Turing never joined major social clubs nor did he attend large social functions. His social experiences looked very much like what he imagined the computer social experience: all male and highly intellectual. He went to an all male school and lived there for his entire

education. At King's College Cambridge, he lived and worked with all men. These men explored their sexuality as well as their intellectual and political interests together (Leavitt 17-19). And in these social settings Turing was relatively safe being open regarding his sexuality. At Princeton, he lived and worked with all men. The only time in Turing's life in which women were present were the 5 years that he was at Bletchley park because women did most of the computing work at that time. Other than this, Turing worked on problems, calculations, and even engineering either in solitude or with groups of all male scientists and technicians. It was also the social scene of all intellectual, highly educated men. These experiences inform his later program for artificial intelligence. When Turing imagines the social context in which the machine is 'raised' towards intelligence, he describes the social setting as exclusively masculine. It is not simply that Turing imagined his computer intelligence through similar mechanisms that disciplined his own body. In addition, Turing's own embodiment and the embodiment that he imagines for the AI are both dynamically constructed through practices and relations of biopower. The practices that I describe above are not passive or neutral activities. Rather, they are the historical consequence of political, economic, and social practices that tend towards normalizing bodies like Alan Turing.

Constructing Posthuman Bodies in the Empire

Above I describe the ways that Turing's embodied experiences parallel the particular ways that he goes on to propose the future of mechanical intelligence. However, before even beginning, Turing already held an understanding of bodies, human life, and his own

life in an ambiguous relation with technology. More specifically, Turing already had to understand his own life and human bodies dynamically in ways that disrupt humanist ideals. The material and social institutions framed Turing as a subject who is at least partially understands human bodies, minds, and experience in mechanical terms. And those relations, through that Turing understood his body, are shaped by historical, political, economic, and social settings. The discourse communities in which Turing engages in are the same discourses out of which the posthuman subject emerges. Hayles looks to Turing's article "Computing Machinery and Intelligence" as an important 'birth' of this posthuman subject (xii-xiii). In Chapter Five, I analyze this paper to demonstrate that Turing was always already constructed as a posthuman subject. And like Hayles, I recognize that this can be empowering for Turing. And at the same time, this posthuman subject also led to greater levels of control and disciplining of Turing's body.

British Body as Beta Version Computer

Jon Agar's work on the history of the computer contributes to this discussion by explaining the political context in which Turing writes, lives, and invents. Foucault writes that biopower, as opposed to sovereign power, "gave rise as well to comprehensive measures, statistical assessments, and interventions aimed at the entire social body or at groups taken as a whole" (146). And the computer is implicated in this work, as Agar explains. Although Foucault does not discuss the computing technologies specifically, Jon Agar writes the history of computers as the central tool for the British government bureaucracy to regulate global populations. In *The Government Machine*, Agar

demonstrates that the British Civil Service provided the prototype to the computer's organization and implantation. This bureaucracy had long been surveying and studying populations through its complex and extensive network of diplomats, civil servants, frameworks, and governmental structures. Computing machines had long been used to calculate, store, and compile data. This use of computation and statistics, Agar demonstrates, was a critical tool in maintaining and regulating a colonial power that spanned the globe.

The model of the British governance is so closely tied to the model of computer technology that Agar asserts, "to study the history of technology is to study the state, and vice versa" (3). Of course, Turing, whose father held a fairly high ranking position in the International Civil Service in India, was born into this legacy of computation for state control. As the Second World War became almost certain, Turing quickly enlisted to aid the British government in developing technologies that would further facilitate the processing, interpreting, and control of statistical data. This was not Turing's initial purpose for developing computer technology. Nevertheless, his wartime inventions were quickly adopted for more administrative use by the British government. His inventions were also directly put back into the service of maintaining the expansive work of British government and commerce around the globe.

In Agar's historical account of digital computation, the body of British Civil Servants—like Turing's father—is the prototype for the computer. Mechanical computers were built to simulate and eventually replace the work done of a large administrative staff of human computers. When Turing first introduced Turing machines in his 1936 article

“On Computable Numbers,” he based his development of digital computation on the embodied work of humans working unintelligently but with discipline on calculations. Later, Turing’s machine would eventually replace the calculating work done by humans. And the goal of this computational invention was further regulate, manage, and control the expansive population of the British colonial power. But before Turing could even have imagined his computer taking the place of these human bodies, he already had to understand humans’ role as somewhat mechanical parts in the larger machine that was the British government. In this account, we see that the posthuman subject is regulated and assimilated into the work of empire. Computers and human bodies are both at the service of government, science, and progress generally.

Posthuman Bodily Enhancements

But this notion of human subjectivity, which Hayles calls posthuman, does not only operate on the level of populations. In addition, we can see this working on the individual subject through a focus on the individual body, especially the individual body as a pliable matter that can and should be enhanced through technology. This notion of posthuman bodies as plastic and porous for technological improvements can best be seen in Norbert Wiener’s writing on cybernetics and Hans Moravec’s cybernetic man, both of which Hayles includes as founding thinkers of posthuman subjectivity. Moravec and Wiener contribute towards the shift towards posthumanism by articulating a dynamic notion of the human body that is pliable and plastic for technological enhancement. For Moravec, technological enhancements of bodies included feedback loops to allow for breathing and

improved circulation to survive extended space travel. In addition to these invasive enhancements for the benefit of science and space travel, Moravec would imagine, one day, uploading human consciousness into digital computers.

David Serlin traces how this same plastic notion of bodies became apparent in the post-WWII surge in plastic surgery and other forms of bodily enhancements. In *Replaceable You*, David Serlin argues that bodily modifications became popular after WWII because the individual body needed to achieve its utmost level of wholeness, health, and “normalcy” in order to reflect the strength and vitality of the national identity. Although he does not use the term posthuman subject, Serlin describes a notion of the individual body that is shaped to best reflect the power and vitality of the nation as a whole. Two related aspects of Serlin’s research relate to both Foucault’s discussion of intervention and Turing’s experience. First, Serlin argues that the health and ‘normalcy’ of the individual citizen represented a microcosm of the state generally. He asserts that, after the brutalities and also the social changes experienced during and after WWII, there was a drive to re-affirm the strength and health of the state by reasserting the manliness and health of its citizens. In particular, with so many men and women who had been wounded in war, cosmetic surgery was seen as a way to technologically reinstate the strength of men and also the beauty of women. Second, Serlin points to the increased use of hormone therapy to regulate gender and sexuality. Serlin documents how “Psychologists and sexual scientists, moved by what they perceived to be the glandular basis of behavior, maintained the orgotherapy [estrogen that was to neutralize

sexuality]... was a successful program that contained the patient's tendency towards sexual transgression" (137).

Although Serlin focuses specifically on American identity and the American state, this is the same hormone therapy that was administered to Turing in order to punish him for homosexual sexual acts. The scientific findings that Serlin describe are the same forms of hormone therapy that were used to 'neutralize' Turing's transgression of homosexuality. This punishment was perceived to be a 'treatment' of chemical castration. British judicial and civil institutions, as well as individual citizens, looked towards these treatments as ways of controlling and artificially bringing "abnormal" genders and sexualities to "natural" norms of feminine and masculine gender identities. Together, in this case, we find knowledge as a kind of dynamic power that is used to determine and regulate norms. In addition, we see how the individual must be managed and the individual body must be managed and intervened upon to regulate and represent the upmost health of the state.

Biopower and the Punishment of Alan Turing

At this point, we see that the institutions of science, governance, and education all form Turing as a subject with sexuality as well as a kind of posthuman subject of the British empire. And these different forms of subjected-ness that form Turing's embodied experience all coalesce and converge at this moment of trial and punishment. In Turing's punishment, the regulation of the subject of the state is absolutely dependent on the mutual regulation of Turing as a sexual subject. Both as a subject of government and a

subject of sexuality, Turing's thinking and his embodied experiences are shaped and controlled through mutual regulation, intervention, and focus on his body.

Just 2 years after the publication of "Computing Machinery and Intelligence," Turing met a young man at in front of the movie theaters. They had a brief affair, which quickly turned sour. The young man seemed to be trying to take advantage of Turing, who seemed unusually willing to be taken advantage of (loaning him money even after the young man stole from him). When Turing returned home one day to find that someone had broken in and stolen valuables, he immediately called the police and alerted them that this young man may have been involved. In the process of investigating the burglary, the police 'uncovered' the sexual nature of their relationship. At that point, they dropped the investigation of the young man and started investigating Turing.

Turing was arrested in March 1952. The young man who Turing had sex with that led to the police 'discovery' was not arrested. This detail is important in order to understand why Turing in particular was arrested, tried, and found guilty. Yes, homosexuality itself was illegal. In particular, male homosexuality was illegal. Female homosexuality seems to have either not been understood as a reality or not be understood as a threat. So not every form of homosexuality was found serious enough for punishment. In addition, not every case of male homosexuality was punished. The young man who slept with Turing did not get arrested. In the process of investigating Turing's 'crimes' the intelligence agencies would surely have discovered that Turing had previous sexual relationships. Those men were not investigated. Rather, it was Turing in particular. To explain why he in particular was perceived as a threat, we have to consider how he

was not simply his sexuality, but also his status as a war hero.

The intersections between Turing's identity as a subject with sexuality, Turing's identity as a subject with national identity, and his intellectual and public status, are significant here. Homosexuality itself, while illegal and stigmatized, was often treated with the standard of 'don't ask, don't tell.' However, in the early 1950's, homosexuality increasingly came to be defined as opposed to the health and security of the state. This can be understood in a few different ways. First, as Serlin argues, the post-war state needed to affirm its strength and power. These perceptions of state health and power reflect the need to affirm manliness. Turing was not just a man who could be sidelined as an outcast or marginal figure in relation to the British state. He was a war hero. He was a personal contact and favorite of Winston Churchill. He was also in the spotlight as an inventor and an intellectual. His arguments regarding machine intelligence were widely publicized and promoted. He was known both as a national hero and a national genius whether or not most people agreed with his arguments.

In addition to homosexuality being perceived as an affront to manliness, homosexuality was also perceived as opposed to nationalism or patriotism. Leavitt explains that the homophobic culture at the time associated homosexuality and any personal deviance with from the norm of heterosexuality with immorality and as a sign of bad character¹⁸. In this case, homosexuality was seen as opposed to manliness, which was also seen as unhealthy or unsound for the strength and manliness of the strong British state. Homosexuality was perceived as a kind of immoral act. Given this perception of

¹⁸ This casual connection between homosexuality and treason would again be drawn in the case of Anthony Blunt in 1979.

immorality, other forms of bad character were associated with homosexuality including deceit. Given the level of sensitive state secrets he was privy to, Turing's sexuality was seen as a security risk. He had been a part of the inner circle of Bletchley Park. He was given a level of access to all forms of the British intelligence and top-secret technology. He was also granted rare access to the Bell Labs in the US. With these knowledges in his head, how could he be trusted? This connection between Turing's sexuality and his character, as well as his status as a war hero, became the focus of the trial. It was unquestioned that he had sex with another man. Turing's character was what was really on trial. He was found guilty.

After the trial, things did not improve. Turing was given estrogen treatment, which was seen to neutralize or sterilize his dangerous sexuality. But that wasn't all. The estrogen impaired his ability to have sex, but he was still considered a security risk. He was forbidden from leaving the country, which he had previously done often for holidays. In addition, police officers would follow him, park in front of his house to make sure that he came and left at expected times, and also showed up at surprise times. Turing had every reason to believe that all of his activities were watched carefully. This level of policing was administered because his sexual "betrayal" of "natural order" suggested a likelihood that he may also would betray his loyalty to country as well.

Turing did not admit any guilt nor did he try to defend himself. When faced with the choice of prison or one year of estrogen injection, Turing chose to sacrifice his sexuality in order to continue to work and continue to live his life. The 'treatment' of estrogen as a form of chemical castration can also be understood from this perspective of

posthuman subjectivity. As Serlin explains, estrogen treatments were seen as a significant and progressive development to improve the sexual health of the state. And as Hayles outlines, this posthuman notion of bodies is always already embedded in technology. As we see in Moravec's and Weiner's cybernetic theories, the dynamic human body is subject to enhancements for the betterment of the health of the state or for the sake of scientific progress. Given these factors, we can better understand why the court offered Turing a choice between prison and chemical castration. The 'choice' of estrogen treatment was offered as a lenient and generous sentence. By choosing chemical castration, Turing was further making decisions within a posthuman notion of his own body. In this way, giving up his sexuality and using technologies to alter his body towards a norm were both preferable to giving up his work and his reputation within the scientific and engineering communities.

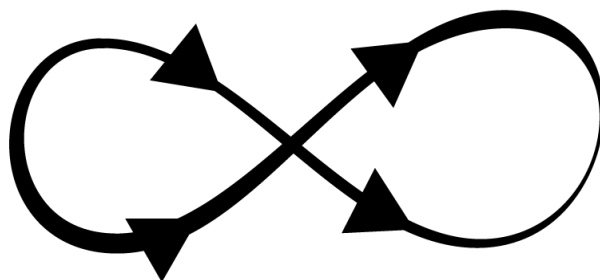
Artificial intelligence too would be, in Turing's projection, co-constituted between mechanical design of unorganized or random machines and interferences of pleasure and pain, experience and sociability. This text is chiasmically connected with Turing's own embodied experience. However, in this chapter we are seeing a far more complex notion of bodies. This body may still be mechanical in many ways, but even this mechanical notion of bodies is composed through a historical, political, and social process of intervening on life and bodies. The systems of biopower that compose Turing's body, his sexuality, also compose his status as subject of the British state. Here, the chiasmic rhetoric that Turing composes brings with it the weight of political, social, cultural, and discursive construction and deconstruction. These bodies that intersect and

appear within Turing's text are dynamic in so far as they come charged with the historicity of the particular body. In addition, Turing then imagines a system of educating machines so that these bodies also experience systems of intervention and disciplining their bodies. In Turing's conception of intelligence, discipline and bodily interference are critical for intelligence. Likewise, his own experience of embodied disciplining form his intelligence, his subjectivity, as well as his knowledge production.

Later in life, a critic of Turing objected that if a computer could learn to write a poem, that poem would not be any good. Turing responded by saying that maybe you would have to be a computer to appreciate the poem. And maybe Turing always engaged with computers on their terms. He would read the computer's output in hexadecimal code because he wanted to read in the computer's native tongue. What I am trying to do is demonstrate that the interventions on Turing's body form him as a subject of government and a subject with sexuality. In the end, Turing identity as a gay man, his identity as a British civil servant, and his invention of artificial intelligence all dynamically, chiasmically inform each other. Turing had been so rigorously disciplined through interventions and violence against his body. Nevertheless, Turing is not simply a cog in the mechanized British state. His embodied particularity reveals small locations in which he moves away from or resists normalization, even despite the intense disciplining. His ability to resist normalization is no doubt, in part, due to his bodily particularity: he had been afforded privileges and great liberty because he played the role of eccentric genius so very well, and this role he played depended on embodied differences including male

and class privilege. In the next chapter, I will further complicate Turing's chiasmic rhetoric by adding the complexity of bodily difference, especially gendered differences.

CHIASMUS 5: DESTABILIZING FORMS



“Bodies never quiet comply.”

~Butler, *Bodies that Matter*

“Machines take me by surprise with great frequency.”

~Turing, “Computing Machinery and Intelligence”

Chiasmus creates relations that allow for, at one time, both difference and similarity between bodies and discourse. As a heuristic for analysis, chiasmus figures the relations between bodies and discourse so that bodies and discourse intersect and interact in dynamic, productive ways. In each chapter, I have turned to the figure of chiasmus to analyze how bodies and discourse interact to construct Turing’s rhetoric as well as the knowledge he produces. These interactions are productive for knowledge and also disciplining forces on Turing’s body and his writing. For instance, I’ve shown how Turing’s embodied experiences learning to discipline and control his body inform his design of computers. In this chapter, I again return to chiasmus to analyze the relations

between bodies and discourse in Turing's life and writing. However, this time, the dynamic relation is more than productive (in so far as productive is also controlled and usable for science); instead, we find that chiasmus destabilizes.

In this chapter, I argue that Turing's writing in "Computing Machinery and Intelligence" is a unique time in this history of the computer in which technologies were embodied and gendered in feminine ways. Turing's writing genders artificial intelligence in the famous Turing Test as feminine and includes notions of gender that are flexible and unstable. This feminine gendering is not limited to machines; rather, Turing's gendering of machine intelligence also implies feminized notions of intelligence. While I will discuss Barad's work in more detail later in the chapter, I will now define that, by using the word 'gendering,' I am drawing on Karan Barad's notion of gender not as a thing or a state but as a material-discursive performance or experience that produces temporary, flexible notions of femininity and masculinity. Gendering is always produced through material-discursive practices and is not attributable to a single material, biological status. In this rather unique time in the history of computer technologies, femininity is central to Turing's development of not only thinking machines but also his definition of what qualifies as a legitimate exhibition of intelligence. Turing destabilizes relations between emerging computing technologies and humans through his use of destabilizing chiasmic rhetoric. This unstable, chiasmic relation calls attention to the ways in which humans and machines are not definitionally opposed, but are rather connected and intertwined.

Turing Moves Towards Machine Intelligence

Before he composes this gender-bending notion of machine intelligence, Turing begins to settle down in his work and his home for the first time in his life. Although the 1948 article “Intelligent Machinery” was not well received by the National Physics Laboratory, that made little difference to Turing. He was moving on. In the fall of 1948, he moved to take a position at the University of Manchester. While Cambridge was ornate, refined, and had all the markers of an elite social status, Manchester was austere, dingy, and was dominated by the decay of old manufacturing industries.

Turing seemed to make himself right at home in Manchester. He bought a home in the suburbs and hired a housekeeper who would write to Turing’s mother snickering about his peculiar bachelor habits. He built a bike that only he could seem to figure out how to ride without crashing. He continued to have a reputation as a strange fellow, even in this less refined city. For instance, Turing would run long distances, sometimes over 20 miles on the way to University of Manchester, where he would start working covered in sweat. He traveled often and dated some. Things were going well, overall.

Turing’s work in the lab was going relatively well. Max Newman started the Manchester Computing Lab and began work on the University of Manchester Computer in 1946. Although the machine was technically named the MARK II, the technicians called this machine ‘the baby.’ Compared to the Colossus that many of these men worked on during WWII at Bletchley Park, this computer was just a baby. It still took up multiple rooms and required legwork to operate. So perhaps it was only natural that this baby soon became Turing’s baby. He wrote the computer’s manual, which is quite entertaining to

read as far as computer manuals go (“Programmers' Handbook for the Manchester Electronic Computer Mark II”). Turing designed the language of the machine, and this language was so complex that the other technicians depended on Turing’s training just to be able to use and operate the computer. Although the baby was cumbersome, prone to operator failure, and at times inaccurate, it still gained some attention for its speed and flexibility in completing different kinds of tasks. Norbert Wiener traveled from the United States to see the machine and to talk to Turing. From this exchange, Wiener was emboldened in his belief that machines could be developed to replicate or even replace human bodies (c.f. *The Human Use of Human Beings*). Turing held a more modest belief. He didn’t necessarily think that machines would replace humans; however, as we will see in “Computing Machinery and Intelligence,” machines did challenge and expand the notion of intelligence and even challenged traditional notions of humanity.

Whether or not the baby was ready, the press picked up on the developments underway with Mark II. And Turing became the ‘face’ of this development. In addition to complex mathematical calculation, they taught the computer, their ‘baby,’ language, songs, and poetry. During a radio broadcast, a reporter brought children to see and hear the baby try to sing popular songs. The technicians explained that the computer was also learning to play chess. A reporter who interviewed Turing cited his goals as “the investigation of the possibilities of machines for their own sake...and to what extent it could think for itself” (Hodges 406). Although this is more moderate than Wiener’s goal of replacing human bodies, the general public did not receive news of Turing’s work and the computer at Manchester with open arms (Hodges 404). In particular, a prominent

neurologist, Sir Geoffrey Jefferson, composes the most widely read critique of Turing's work. Jefferson explicitly objects that Turing's intelligent machine challenges the humanist exclusive claim on intelligence. This critique is especially of note in this dissertation research because Jefferson's arguments reveal that, even at the time, Turing's machine and his writing were received as threatening and destabilizing.

Destabilizing Chiasmus

Chiasmus is a dynamic figure. In Chapter 4, I demonstrated that chiasmic figuring between bodies and discourse could produce a dynamic, co-constructive relation. In that movement of chiasmus, to be dynamic means to be active and also suggests the capacity to create a change. In particular, dynamic chiasmus allow for changes that are a co-constructive shaping of both Turing's discourse and embodied experiences. Turing's original and innovative writings are composed, in part, through the dynamic relation with his embodied experience. Although I identify this as a form of disciplining, it is also productive for Turing's inventive and original thinking.

Now I return to the dynamics of chiasmus to demonstrate that the relations between bodies and discourse are at time destabilizing or disruptive as well as productive. To be dynamic suggests power and the ability to cause changes. The *Oxford English Dictionary* defines dynamic specifically as "force producing motion." In Greek, "*dynamis*" means power or strength. Dynamics, the science, is the study of "the action of force" (OED). Dynamics thus at once can be understood as a physical property of force and also more generally as the capacity or potential to change or exert force. In the

history of rhetoric, the physical notion of dynamics can also be found animating discourse and persuasion. Fahnestock finds chiasmus in Heraclitus: “Cool things become warm, and the warm grows cool” or “the moist dries and the parched becomes moist” (141). These chiasmic phrases structure Heraclitus’ philosophy of reversibility, flux, and eternal change. Jean-Pierre Vernant defines the sophistic practice of *dissoi logoi* as a “dynamic view of argument” (286). He compares this method to mechanical devices, like pulleys or weights, which can change the dynamics of moving a load or weighing a quantity. Similarly, Vernant describes the *technê* of *dissoi logoi* as one that changes the dynamics of an argument so that the orator in the weaker position may appear stronger. Steven B. Katz argues that Cicero should be considered in the sophistic tradition because Cicero, like the sophists, understood rhetoric as a musical and poetic form. That is, rhetoric has a sensual as well as a symbolic function, and that sensual function is a form of dynamic experience: poetics, rhythm, and rhyme. Together, these forms of sensuous language use are not simply decorative but also produce a form of “affective knowledge” (108-9).

Chiasmus, as a rhetorical form and as a relation between bodies and discourse can produce rhetorical effects that destabilize, that disturb, that unsettle. When figures emphasize balance, as parallelism and in a different way antithesis do so well, they may also make relations appear natural and harmonious. To appear as a natural and harmonious relation between bodies and discourse would, in effect, cover over the movement, negotiations, and tensions between the language that we use, the technologies of bodies, and also the bodies that compose our lives. Therefore, chiasmic relation

between bodies and discourse may not always create a peaceful, calm relation that is settled and stable. No, the opposite is the case. Chiasmus allows us to see the unsettled, constantly negotiating, reforming movement between bodies and discourse. This is significant because there is no one relation between bodies and discourse. Rather, there is a constant *relation-ing*, a constant forming and reforming. Likewise, in this dissertation, chiasmic rhetorics—those rhetorical effects that emerge out of the relation-ing between bodies and discourse—are processes or movements that change with the particularity of the bodies and the particularity of the discourse. In each chapter, bodies, discourses, as well as Turing's own writing and life, have been forming and re-forming to produce new chiasmic rhetoric as well as new knowledge and new technologies.

However, in this chiasmic movement, there is also tense negotiation. With each chiasmic relationing between bodies and discourse, we find new iterations of bodies and new forms of discourse. These surprise and even startle. Turing's article was certainly received with surprise, even if that surprise was also a largely negative one. Although I would not go so far as to say that these moments are necessarily empowering or progressive, I do want to suggest that in the chiasmic relationing between bodies and discourse, new relations, new discourses, and new embodied experiences can be produced. These new relations open the possibility of disturbing reified, naturalized notions of bodies. Before I can say that a positive chance is perhaps possible, I can say at the very least these out of balance relations between bodies and discourse call attention to the process of constructing relations between bodies and discourse. This relation often remains unnoticed in its ossified form where bodies are so often defined as natural and

passive. Unstable chiasmic rhetoric allows us to see what is often so naturalized that it goes unnoticed: the unstable, chiasmic relations between our bodies and our discourses.

Critiques of Machine Intelligence

When word of Turing's machine reached the general public, this unstable relation between human and computer elicited a strong negative reaction, notably from University of Manchester neuroscientist Sir Geoffrey Jefferson. Jefferson published his critique in the article "Mind of the Mechanical Man," which circulated widely. Jefferson begins his critique by addressing the question of the relation between brain and mind. Jefferson was a renowned expert on this topic: he innovated neurosurgery during and after WWII. He saw firsthand how physical, neurological, and psychological trauma would affect not just the brain but also the mind and body in different ways. In his discussion of mind and brain, Jefferson argues that human intelligence is directly connected to embodied experience. He then goes on to argue for a version of 'true' intelligence (the machine could at best hope to be a parrot spitting back a few lines it could learn) that would be unattainable by machines: this would be creative, emotional, and even sensory intelligence.

Jefferson concludes that even if we could build an intelligent machine, to do so would be inherently anti-humanist: an affront to the centrality and superiority of humanity. In this article, Jefferson defends a strong humanist notion of intelligence in which intelligence is the sole property of humans, and excludes any machine, and even animals. This is so, for Jefferson, because the human brain is completely and

unexplainably unique: “its functions may be mimicked by machines, [but the human mind] remains itself and is unique in Nature” (1106). For Jefferson, humanity is the definition of intelligence, and intelligence is the defining quality of humanity.

And what qualifies humans to be the sole possessor of thought and intelligence? Jefferson defines this as the whole range of human experience of pleasure, pain, and even love and sex. In particular, Jefferson defines language as the thing that sets humans apart from even the highest animals: language use, and the ability to use language to remember more and to advance human knowledge.

Not until a machine can write a sonnet or compose a concerto because of thoughts and emotions felt, and not by the chance fall of symbols, could we agree that machine equals brain—that is, not only write it but know that it had written it. No mechanism could feel (and not merely artificially signal, an easy contrivance) pleasure at its successes, grief when its valves—fuse, be warmed by flattery, be made miserable by its mistakes, be charmed by sex, be angry or depressed when it cannot get what it wants. (1110)

A machine may be able to spit out correct answers or repeat stock phrases, but intelligence requires a full range of embodied and discursive behaviors. A machine could never have these things; hence, a machine cannot be said to think.

At the heart of Jefferson’s argument, we find a humanist argument, and also the human body. The embodied experiences of humans—our experiences, passions, and emotions—these constitute intelligence. In some ways, Jefferson’s arguments align with the Barad and Grosz’s arguments that intelligence is embodied and that our embodied

experiences inform our thinking and knowledge production. However, Jefferson's primary critique is that the human mind has some thing, some soul like essence, that is always more than bodies and always unexplainable through material sciences. In many ways, I also agree with Jefferson's nuanced and complex description of the relations between bodies and intelligence.

In his response, Turing agrees on many of Jefferson's points. Turing agrees that the analogy between human brains and computing machinery is a weak analogy in so far as human brains and bodies are far more complex. In addition, Turing will agree that human intelligence is a product, in part, of our human embodied experiences and emotions. However, Turing will shift the conversation.

As we found in "Intelligence Machinery," Turing locates intelligence through a broader set of experiences and bodies. What is especially significant here is that when Turing moves to defend machine intelligence against these humanist critiques, Turing not only 'humanizes' computing machinery, he also genders machines as feminine. He does this first by comparing creating a parallel between a test to guess the difference between a man and a woman with a test to guess the difference between a machine and a man. In addition, this descriptions of machines at work include discursive practices that feminine the machines, the technicians, as well as intelligence itself. This gendering of computer technology creates a blurred relation between technology and humanity. This moment of blurred gendering and embodying of computer technology is a significant point in which Turing expands notions of intelligence. To complete this argument, Turing creates

dynamic relations between humans and computers that further disturbs and challenges humanist definitions of intelligence.

Dynamic Rhetoric

While I have been discussing chiasmic rhetoric as especially dynamic and even disturbing, in so far as its goal is to create a change, rhetoric itself has been understood as a form of dynamics. Contemporary rhetorical theory revives a notion of rhetoric that is energetic with life. That is what George Kennedy suggested in his surprising article “Hoot in the Dark.” Scholar of Greek and Classical rhetoric and translator of Aristotle, Kennedy argues that rhetoric is energy and as such rhetoric includes more than language, including “physical actions, facial expressions, gestures and signs generally” (4). Starting with the definition that rhetoric is energy, Kennedy expands his notion of energy of rhetoric to exist before speaking or writing and even prior to the speaker’s intent. The result is that animals and even plants can behave rhetorically by exerting their energy to enact a change or response, whether or not that exerted energy is intentional. In this definition, rhetoric becomes defined in a way that is indistinguishable from life and living. Steven Katz also proposes an energetic notion of rhetoric in *Epistemic Rhetoric of Music*. In this book he theorizes the non-referential knowledge of language, which is driven by emotion and the body of the author, as a form of knowing. This form of knowledge can only be understood in the experiential and temporal qualities of language. This is the sensuous side of language, which is always tied to language’s symbolic function, but also exceeds the symbolic function in ways that are experienced rather than

defined. This musical, sensuous function of language is exclusively dynamic in that sense because it exists in time and action. Debra Hawhee also turns to the ancient Greeks to develop a theory of energetic rhetoric. *Agon* is a significant term for her thinking on Greek rhetoric and athletics because it connects persuasion and physical strength with a focus on bodily struggle. Agonism is struggle and competition between athletes, orators, as well as heroes, statesmen, and the gods. It is a “dynamic through which the ancients repeatedly produced themselves, and which functioned as a point of cultural connection between athletics and rhetoric” (15). And this point of production is significant. The Greek body and mind were not simply thought to be: body and mind are brought forth or constituted in action. This is where agonism comes in: through dynamic energy, struggle and gathering, the art of bodies and words were constituted. Both Hawhee and Dolmage also theorize the Greek term *metis*, which was a Greek term for craft, skill, or practice that lead towards artful mastery and knowledge, as a major concept for rhetorical practice because of its emphasis on embodied practice and knowledge.

Feminist philosopher Karen Barad can also contribute to our notions of energetic, dynamic rhetoric. Her theories of material-discursive relationing offer a definition of rhetoric that speaks to both rhetoric studies and feminism. In this dissertation, I focus specifically on the rhetoric that emerges from the interactions among bodies and discourse. This form of rhetoric, which is represented in this complex movement of chiasmus, is always connected, intersecting, and dynamic relation between material and discourse.

Chiasmic rhetoric is different from Kennedy's notion of rhetoric in so far as chiasmus cannot be pre-linguistic. Kennedy would hold that even before language developed, rhetoric was energizing and evolving pre-human life. Because it is pre-linguistic energy, rhetoric can be seen as a force in organic evolution. However, I have theorized chiasmic rhetoric that needs to always be intersecting with both material and discourse. This chiasmic relation is like the Möbius strip that Elizabeth Grosz describes between body and mind. The Möbius strip allows us to see relations of body and mind that "are disparate "things" being related, they have the capacity to twist one into the other... [The Möbius strip] enables subjectivity to be understood as fully material and for materiality to be extended and to include and explain the operations of language" (209-210). With these dynamic figures, discourse always twists and turns into material and material likewise twists and turns into discourse. The purpose of these figural heuristics is to make visible the connections and twists between bodies and discourse. Likewise, when Jean-Luc Nancy imagines a radically de-centered, postmodern notion of bodies, what he calls *corpus*, is always already touching writing. In the process of naming, language brings objects, actions, values, concepts into being identifiable and knowable. Karen Barad calls this work the 'temporary cut' of discourse intra-acting in material. Language and discourses name, and naming is a mode of composing the diversity of material reality into things that are knowable. Language distinguishes some assemblages, events, and qualities as significant within larger network of material and energies.

Here, Karen Barad's work contributes by defining a rhetorically significant theory of ontology that also can help us comprehend the change in Turing's body life,

represented and instantiated (embodied) in “Computing Machinery and Intelligence.” Barad, like so many before, argues that the workings of the material universe and the workings of human discourse are not so dissimilar. She comes to her ontological and philosophical claims through her background as a physicist and a feminist. All material and all cultural phenomenon are constructed through interrelation between “phenomenon” and “force,” which are the terms Barad uses instead of thing or object because phenomenon and force both suggest movement, space, and time. Barad’s theories of actions allow for an account that “refuses the representationalist fixation on “words” and “things”...advocating instead *a causal relationship between specific exclusionary practices embodied as specific material configurations of the world*” (“Posthumanist Performativity” 132). The interactions between matter—atoms, planets, and physical forces—constitute each other. Likewise, discourse and bodies interact with learned language practices and other bodies performing those language practices. In performative language, words are defined as “discursive practices/(con)figurations” and things are “specific material phenomena” (132). From this, Barad gives us an ontology that is defined and constituted through a “dynamic process of intra-activity in the ongoing configuring of locally determinate causal structures” (135). And this dynamic process is—for all human ethical and political purposes—always already discursive, in so far as language is one of the most significant “locally determinate causal structures” that produce our ontology.

Dynamic Rhetorical Bodies

In Barad, we find ontology defined as interactions, but are all of those interactions equal? Are all interactions as meaningful as others? Are the interactions between Turing's body and the cold Manchester industrial landscape as significant as the interactions between Turing's body and the court mandated estrogen treatments that he will experience just 2 years after the publication of "Computing Machinery and Intelligence"? Certainly both affected the man and his knowledge production. Politically, I have to find the relations between Turing body, the doctors administering the chemical castration, and the estrogen that infused his body and changed his physical appearance as well as his thinking, mood, and sexual ability, as more significant. This is because these later interactions regulate Turing as first a 'deviant' body, and then normalize it through physical interventions and medical 'treatment.' These later interactions subject Turing's body to disciplinary practices that regulate heteronormativity. These interactions reinscribe a notion of gay men as being dangerous, pathological, and in need of medical treatments to pacify this threat.

For making these distinctions, I have to think that we need *rhetoric*. Barad uses the term 'agential cuts' to indicate the rhetorical work of identifying and demarcating specific objects and specific interactions. These cuts "are at once ontic and semantic. It is only through specific agential intra-actions that the boundaries and properties of "components" of phenomena become determinant and that particular articulations become meaningful" (*Meeting the Universe* 148). We make temporary cuts in the world to define 'woman' as a meaningful and real category of human. Now, this temporary cut

is not an intentional cut. Although Barad refers to these as “agential cuts” she specifies that the cuts are “enacted not by willful individuals but by the larger material arrangement of which “we” are a “part”... Cuts cut “things” together and apart. Cuts are not enacted from the outside, nor are they ever enacted once and for all” (*Meeting the Universe* 178-179). Through the repetition, fixation, and consistency of woman as a category of human reifies and ossifies this as a meaningful, significant, and even can appear fixed or natural. This does not mean that the category of woman is constitutive of our ontology, but the material discursive performance of naming, categorizing and knowing ourselves as gendered is constitutive of our ontology. The temporary cut that defines my body as woman constitutes my body as legible and knowable as a particular kind of human subject among other humans. With this temporary cut as woman, discourse and material interact so that I may identify myself. In some ways this temporary cut can work to limit my experience as sexism, but has so often worked to use the temporary cut of woman to regulate limits on the experience and potential for women subjects. At the same time, I myself come to know myself in this subject position and also can use this knowable category to identify with, however contingently and temporarily, with other women. Barad does not identify these temporary cuts as rhetoric. However, this work is wholly rhetorical. These are the practices that make order, sense, knowledge, and value through the temporary cuts made in material-discursive practices.

With Barad’s theories and an energetic notion of rhetoric, we can define rhetoric as material-discursive practices that create knowledge, value, and power through ‘temporary cuts’ into the larger always-connected fabric of human experience. However,

like Kennedy's notion of rhetoric, the rhetorical force of Barad's temporary cuts is not intentional in the traditional form of authorial intent as something planned or willed or chosen by Turing or any other human agent. For Kennedy this is because the energy to cry for help or the energy for a plant to turn towards the sun does not require a conscious will. When I yell because I stub my toe, my yell has rhetorical energy, but it lacks intentional meaning and intention to create a change. Nevertheless, change may happen: my roommate may come to my aid.

Again, Barad can help to theorize notions of agency that are rhetorically significant, without depending on a notion of intention or a free moral agent. She defines the agency of bodies and material through a theory of agential realism, which claims that all matter has some form of agency. This agency should not be understood as choice or intention. The agency of matter represents grounds for negotiations or inter-action. Barad argues that material and discourse are in a constant state of inter-action. The energy and intra-actions are constantly *becoming* through material discursive practices. This dynamic process is agency: "Agency is not an attribute but the ongoing reconfigurings of the world" (135). In this context, 'discourse' could be understood as any relationality between entities. Like Grosz's definition of embodied subjectivity, embodiment is the site of contestation or negotiation between material and culture. Within these 'negotiations' between material and culture, both parties have access to agency in so far as both determine and affect the other. In this way, agency is not a thing to own or to give. Rather, "It is through specific intra-actions that a differential sense of being is enacted in the ongoing ebb and flow of agency. That is, it is through specific intra-actions

that phenomena come to matter—in both sense of the word” (135). Hence, agency is enacted. It, too, is a dynamic performance.

Chiasmus has allowed the ‘temporary cut’ of my rhetorical work to always connect both bodies and discourse. Together, these connected bodies and discourse have been shown to be powerful for knowledge construction. Turing’s material-discursive rhetorical practices give us a temporary cut in which bodies and technologies inform each other. What we find in “Computing Machinery and Intelligence,” is that the temporary cut Turing represents as the relation between bodies and technologies, between humans and machines, displays Turing’s dynamic and ambiguous definition of human and gendered experience. This dynamic nature is visible in all rhetoric, as I have defined rhetoric as an energetic set of material-discursive practices that create action, construct meaning, produce knowledge, enact power, and also to assign value. In “Computing Machinery and Intelligence” the gendered discourse creates relations that are especially unstable. Turing’s chiasmic rhetoric expresses relations between bodies and discourse that are destabilizing. But that out-of-balance in Turing’s writing is the key in so far as it calls attention to the relation between bodies and mind, machines and intelligence, and also offers a unique and unusual notion of technology that challenges humanist notions of mind and body. This challenges not only humanist notions of human intelligence, but suppositions in the rhetoric of science and technology about humans and machines.

Later Critiques of Turing Test

Although Jefferson's critique is an early one, similar lines of argument continue to critique Turing and the shift towards digital technology and artificial intelligence generally. Jefferson faults Turing on many of the same grounds that scholars fault Turing and the computer technologies that are so often attributed to him: by arguing that machines can think, Turing has disembodied intelligence. Turing's arguments for intelligent machinery continue to be understood as an anti-humanist and disembodiment.

Jay David Bolter articulates an extensive discussion of disembodiment technology in *Turing's Man*. In order to argue that Turing disembodies human intelligence, Bolter depends on what he defines as an age-old metaphor between humans and technologies. Metaphor is a rhetorical trope that, unlike schema, is not defined by any particular syntactic or formal qualities. He argues that Turing's invention allows for the tightest and closest metaphor between human bodies and technologies. Turing takes the logic of abstract mathematics—pure logic without material referent—and applies that as the foundational concept for digital computers. This, for Bolter, allows for a metaphor in which bodies are understood as metaphors with the exact terminology and purpose as digital computers. This metaphor that Bolter associates with Turing's digital computer perpetuates a notion of intelligence that is abstract, universal and disembodiment. To be sure, this notion excluded any bodily specificity, especially gender. While Bolter is tracing a larger social trend regarding digital technologies, he also places the weight of the instigator on Turing's shoulders. Friedrich Kittler also associates Turing with the trend towards disembodiment. The logic of Turing's machine is "tantamount to declaring

nature itself a universal Turing machine” (1). The particularity of nature, bodies, and machines is irrelevant, in Kittler’s reading, once code has subjected everything to universal computability. Turing split software instructions and hardware machinery and, in doing, erased the materiality of technology under the rule of abstract code. Wendy Chun also points towards Turing as one of many inventors who allow for the “erasure of the vicissitudes of execution [and]... the conflation of data with information, of information with knowledge” (53). This erasure happens through a tautology from code to meaning: “source code as logos: as something iterative and universal. Word becomes action becomes word becomes the alpha and omega of computation” (167).

All of these claims, in general, are valid critiques and descriptions of trends in technology in general and digital computation in particular. However, we need to look more closely at Turing’s work because, especially in “Computing Machinery and Intelligence,” we find an unstable blurring between human bodies and computer intelligence. The embodiments and intelligence that Turing describe blur the lines between human and machine, and that blurring is of central importance because it disrupts the ossified, sterile notion of technologies. If we define bodies strictly in humanist terms, then Turing can be understood as positing disembodied notions of intelligence in the machine. However, Turing does not maintain a notion of human-only intelligence. Nor does he attempt to create machines that will be exactly like human bodies. Rather Turing defines machine intelligence in a way that is ambiguously between human and machine. The locations of blurred overlap between human and machine

intelligence widen, for Turing, new possibilities for thinking, creating, and problem-solving.

These machines must have a material form or ‘body’ of some sort. In other words, computers may have been defined in abstract, immaterial form, but even digital computation is also material, concrete, and ‘embodied.’ They are a particular form of body, and they differ from human bodies for sure. However, they are bodies nonetheless. And ignoring these bodies we ignore their material design and also their material experience. In the case of Turing’s article, ignoring the embodiment of the thinking machines also means ignoring the gendering of machines. It means ignoring a moment in the history of computing in which gender was being negotiated: both the gendering of the inventors and also the machine. Finally, this means ignoring a time in which computers were not sterile of the messy lives of humans. But in the ambiguity of the chiasmic rhetoric, of Turing’s writing, of the Turing Test, and probably of Turing’s mind, the machines were indistinguishable from humans, with their genders, desires, loves, deceit, failures, and rewards. Clarifying up this ambiguity means ignoring an unstable chiasmic intersection between human and machine life.

Computing Machinery and Intelligence

“Computing Machinery and Intelligence” is Turing’s most widely read and also his most famous article. Its popularity is in no small part due to the style of writing, which is both surprisingly clear and surprisingly entertaining for an article by a mathematician. Turing was writing not for other mathematician but for a broader audience that would have

discovered Turing's thinking for the first time—in this article published in the premier philosophy journal *Mind*. In this article, he introduces what has become known as the Turing test. This test has become a well-rehearsed standard of evaluating computer intelligence. Although the general concept of the Turing test is well known, I am going to analyze Turing's text in more detail in order to demonstrate that, not only is this text fully enmeshed with bodies and embodied experiences, it is also integrated with feminine gendering discourses. With these gendering discourses, Turing's text articulates a chiasmic rhetoric that shifts normative relations between our bodies, our discourses, and our digital technologies.

Turing opens by replacing the question “can machines think?” with a more specific question that can be tested through an imitation game. To introduce this imitation game, Turing starts with a gendered imitation game:

It is played with three people, a man (A), a woman (B), and an interrogator (C) who may be of either sex. The interrogator stays in a room apart from the other two. The object of the game for the interrogator is to determine which of the two is the man and which is the woman. (441)

The interrogator can ask the man and woman questions, but the interrogator cannot see either or hear their voices. In this game, deception is the rule. The trick is that the woman is supposed to be honest and the man is tasked with tricking the interrogator with making the wrong choice: “it is A's object in the game to try and cause C to make the wrong identification” (441). After establishing this first game of gendered deception, Turing switches the man for a computer: “What will happen when a machine takes the part of A

in the game? Will the interrogator decide wrongly as often when the game is played like this as he does when the game is played between a man and a woman? These questions replace our original, ‘Can machines think?’” (441).

Turing then defines machines in this test specifically as digital, electronic computers. Next, Turing extends the discussion he started in “Intelligent Machinery” on how to train these machines to demonstrate intelligence. This time he finds that the pleasure/pain model, which he outlined in “Intelligent Machinery” and was discussed in Chapter 4, would not be enough. Instead, he adds gradual training through practice and repetition. Turing then moves on to review and address objections, including specifically Jefferson’s objections. This discussion is some of the most interesting and surprising of Turing’s writing. For instance, he addresses the “theological objection” that only men have souls and hence only men demonstrate intelligence (449). To which he writes that if intelligence is a sign of a soul, perhaps these machines are just new homes for souls. When addressing the “disability’ objection”—which addresses Jefferson’s objection that because computers cannot perform a wide set of human activities, then they cannot be said to think—Turing writes that, presently, computers are too limited but that with time machines may be able to perform a greater array of behaviors (453-455).

In this description of the famous Turing Test, Alan Turing describes a very confused game between genders, humans, and machines. And scholars of artificial intelligence have long been sorting through this confused game. Is the computer acting like a man acting like a woman? As Leavitt reads it, this is the most literal translation of the text. Is the computer acting like a man while the woman acts like a woman and the

other test is which is genuinely human? These genders are further confused because Turing goes on to refer to the human subject B, which was originally a woman as ‘he.’ Although reading this text leaves open some very provocative ambiguities, most scholars of Turing and machine intelligence have been quick to reform this confusion so that it excludes gender and embodied experiences. Hodges quickly assumes Turing’s use of gender unnecessary to the general concept: gender is a distracting and poor choice, a red herring (415). Hodges then proceeds to explain the test gender-free. Copeland argues that gender of the test is necessary for comparing scores, but that the actual test of intelligence is gender neutral (435-436). Lasségue does allow the gendered aspect of the test to remain ambiguous, but he does so in order to reject the test and Turing’s thinking as illegitimate for scientific work. Most often in contemporary versions of this test, gender is erased completely (Copeland & Proudfoot, “The Computer, Artificial Intelligence, and the Turing Test;” Schnelle, “A Note on Enjoying Strawberries with Cream;” Whitby, *Artificial Intelligence*). Even Turing erases the gendered aspect of the test in later arguments for mechanical intelligence (“Can Automatic Calculating Machines Be Said to Think”). He, too, must have felt the discomfort of this ambiguous relation between human and machine life. By erasing gender from the test, these men proceed with a more cleanly demarcated difference between man and machine. Arguably, by erasing gender, they are then able to define intelligence free of the complex particularities of bodies. I am not interested in providing the most accurate or effective reading of how to design or execute the Turing test. Instead, I want to take this ambiguous relation and allow it to remain productively ambiguous. This is because in this ambiguous relation between

human and machine we find a discursive gendering of not only machines but also intelligence. Like Hayles, I wonder “What do gendered bodies have to do with the erasure of embodiment and the subsequent merging of machine and human intelligence” (xii). Hayles leaves this question regarding Turing unanswered while she turns in detail to the Macy Conferences and their role in discursively segregating bodies and material. However, Turing’s article is especially significant exactly because he does not allow for a clear distinction between human and machine experience and intelligence nor does he allow for an erasure of bodies. Instead, he leaves a dynamic chiasmic relation between human and machine. Next, I will demonstrate this ambiguity by addressing the particular embodiment of the machine, the feminizing discourse, and finally the relations between gender and intelligence.

Gendering the Turing Test

As with all of Turing’s writing, embodiment can be found in “Computing Machinery and Intelligence” informing Turing’s thinking, his invention, and also his concern with the design and capabilities of thinking machines. However, in this article the character of that embodiment is unique in so far as the machines are gendered to a degree that is unusual in technical writing, and even Turing’s unusual style of technical writing. But notably, feminizing intelligent machinery can be found throughout the article. Gendering technologies through discourse is by no means unusual. Brian Easlea demonstrates that, when building the technology for nuclear warfare, the engineers and scientists consistently framed themselves as fathers birthing and breeding their nuclear weapons.

However, Easley also demonstrates that the scientists or engineers as well as the technologies themselves were gendered masculine. Through technology, these men metaphorically erased the need for female reproduction. Feminist scholars and gender theory scholars have demonstrated the many ways that computers, weapons, and other technologies in the 20th century were gendered as masculine, thereby becoming technological extensions of masculine strength and power (see Grint and Gill; Seidler; Cockburn). Contrary to this discursive code, Turing genders both the machine and its inventors as feminine.

The first way that Turing genders this intelligent machine is by the gendered test. The man and the woman are supposed to serve as a ‘control group’—a standard to evaluate how effectively an interrogator can guess the ‘true’ body based only on the subject’s responses. The man A is supposed to pretend to be a woman. The questions for this test are decidedly feminized: “will X please tell me the length of his or her hair” (441). Even when the interrogator is choosing between a human (unsure if that is male or female) and a computer, the questions are still ambiguously gendered: “please write me a sonnet on the subject of the Forth Bridge” (442). The interrogator also asks about chess, and poses a mathematical problem, which the machine answers incorrectly. Later, Turing does refer to the human player in the human/machine examination with masculine pronouns. The woman in the first scenario seems to have disappeared without explanation or comment.

Although Turing seems to have dropped the woman in this test, other forms of gendering can be found throughout the article. We also find feminizing phrases and

metaphors throughout this article. Turing writes, “we do not wish to penalize the machine for its inability to shine in beauty competitions” (442). Here, Turing humorously imagines how poorly his ‘baby’ will perform when evaluated for its physical beauty. When considering what qualifies as intelligence, Turing writes this beautiful list of things that qualify as intelligence but that the machine cannot do:

Fall in love, enjoy strawberries and cream, make some one fall in love with it, learn from experience, use words properly, be the subject of its own thought, have as much diversity of behavior as a man, do something really new. (453)

Turing then addresses each of these concerns and argues for ways that machines can be said to perform these forms of thinking. We also find feminine gendering with Turing’s inclusion of emotion. But not just any emotion: falling in love and making someone [or some machine] fall in love with a machine. Notice, sandwiched between falling in love and being loved, Turing includes the feminizing and somewhat sexualizing “enjoy strawberries and cream.” With these considerations, Turing aligns the performance of intelligence with stereotypically feminine activities. It is also notable that in this long list of things a computer is not supposed to be able to do, Turing address each of the objections, but he leaves falling in love or being fallen in love with unanswered. In these ways, Turing’s feminizing discourse destabilizes the usual relations expected between human bodies and machine bodies.

To be sure, gendering a machine as female is no rare task. There is a historic precedent for gendering tools, bodies, and things that are seen as in the service of life as feminine. One of the very first films on the possibility of machines to run out of control,

Metropolis, portrays technology not only as feminine but also as hyper-sexualized femininity. Ships have long been christened with feminine names and adorned with feminine figures. Pilots name their planes women's names. Car companies feminize their products in order to appeal to male drivers. However, Turing's use of feminizing discursive practices is unique because Turing is gendering technology not as a tool for use but as a new form of intelligence. This feminized construction is a thinking machine, and that thinking is not in the service of someone or something else, but in the service of thinking itself. In particular, feminine gendering, in this article, is constructed as an essential and even defining quality of intelligence and humanity, thus making the feminization particularly important.

Consider what Turing imagined what this machine could do: play chess, write poems, learn language, and sing songs. This machine then, is doing the creative, intelligent work. Some of these tasks, like math and chess, are characterized as masculine. (Turing almost exclusively played chess with men. The one woman who he found to be a worth chess opponent he also proposed to marry. Turing continually remarked on how she could play chess like the men. He called off the engagement after a few months.) At the same time, the machine could do things like write poetry and sing songs that are associated with femininity. The pursuit of these arts, especially by connecting them to the sciences, was decidedly feminizing move. This brought considerations of taste, emotion, and pleasure into a field that has been dominated by a *telos* of productive, efficiency, and rationality.

What about the scientists who ‘raise’ this machine? How does this article gender their role in connection with the machine? This would include Turing as well as any technician or scientist constructing a thinking machine. To begin, Turing specifically states, in one especially strange place, that Turing would need to be “all of one sex” (443). At Manchester, the team would have been composed primarily of men. Some women also aided in the coding and operation of the machine, but they would have had a secondary, supportive role in the operation of the machine. No women were included in the public debates over machine intelligence. One may expect that these expert minds that Turing describes would be masculine gendered due to being an all male group, and also associated as masters over this machine. But that is not what we find. Instead, Turing genders the scientists as feminine also. They are all mothers. When discussing the work of coding instructions for this machine, Turing uses the analogy:

Suppose Mother wants Tommy to call at the cobbler’s every morning on his way to school to see if her shoes are done, she can ask him afresh every morning.

Alternatively she can stick up a notice once and for all in the hall which he will see when he leaves for school... and also destroy the notice when he comes back if he has the shoes with him. (445)

In this example, the work of coding is compared to a mother training a child. This work is done in a domestic sphere, the home, and for domestic pursuits, getting her shoes fixed. The narration that Turing writes differs significantly from his earlier proposal for training with pleasure and pain. Here, the material coder gives instructions and tasks without threatening the child-like machine. Later, Turing identifies the work of setting up the

initial state of the mind (either human or machine) as a “birth” (460). These (male) mothers (scientists) first birth, then raise and train their ‘baby’ to perform tasks, learn new skills, sing songs, and write poetry. Turing’s chiasmic rhetoric creates a unique feminine gendering of an all-male, typically masculine, group of engineers, technicians, and scientists.

This gendering should not be misunderstood as Turing’s assigning any essentially gendered qualities to machines. Both the gender as well as the intelligence cannot be thought of as genuine or original. In this test, originality and authenticity cannot be included as criteria for judging gender or intelligence. Originality, Turing finds, is not necessary or even possible for machines or humans. The gender of both the man and the woman was a deception or a performance, not an authentic quality determined by their bodies. Even creative works and intellectual work are not original. When addressing the objection that the machine can only produce new solutions or combinations out of what the machine has been given by the engineers, Turing finds that machines are not alone in their lack of pure originality: “There is nothing new under the sun.’ Who can be certain that ‘original work’ that he has done was not simply the growth of the seed planted in him by teaching, or the effect of following well-known general principles” (455). In this way, Turing identifies the intelligence of humans and machines to be equally shaped by education, ability, and previous experience, even language and culture.

In fact, not only is authenticity outside of this consideration, but also the abilities to trick and to fail are not only incidental but also pre-requisites for intelligence. Turing states this explicitly: “The question, “Can machines think?” should be replaced by “are

there imaginable digital computers which would do well in an imitation game?" (448). Even in the first test between man and woman, Turing states the man's "object in the games it to try and cause C [interrogator] to make the wrong identification" (441). Turing includes deception in this test by having the machine produce an incorrect answer in response to a calculation: in response to "add 34957 to 70764," the computer first waits 30 seconds then answers "105621" (442). The computer would actually need to decide to fail in order to "deliberately introduce mistakes in a matter calculated to confuse the interrogator" (454). When directly addressing the objection that intelligence requires the ability to err or fail, Turing agrees that, hypothetically, machines cannot err, but, practically, the functioning of the machinery and the code both lead to errors. More than that, at times these failures to follow the expected conclusions are not errors at all, but new conclusions. "Machines take me by surprise with great frequency," Turing relates (455). One way in which the Manchester University Computer took its inventors by surprise was with the little love letters that they programmed the machine to produce. Shortly before Turing's death, Christopher Strachey, Turing's colleague at Manchester, programmed computers to write letters (Hodges 477-478). These love letters were awkward. But, to these inventors who were so invested in this baby, these random compositions of stereotypical affection were surprisingly charming notes that were posted about the halls of the Manchester Computing department:

DARLING SWEETHEART

YOU ARE MY AVID FELLOW FEELING. MY AFFECTION CURIOUSLY
CLINGS TO YOUR PASSIONATE WISH. MY LIKING YEARNS FOR YOUR
HEART. YOU ARE MY WISTFUL SYMPATHY: MY TENDER LIKING.

YOURS BEAUTIFULLY

M. U. C.

Turing at the Beginning of Posthumanism

Hence, we find a notion of intelligence that is gendered, performative, and deceptive in “Computing Machinery and Intelligence.” Turing’s discourse creates a blurred distinction between human and computer intelligence. These ambiguous distinctions between human and machine are significant because these disrupt humanist definitions of intelligence that have so often excluded women and people of color. And Turing acknowledges this significance of his work. He writes that arguments that exclude animals and machines from intelligent thought resonate with many of the same claims that have excluded women from intellectual pursuits (449). Jefferson charges Turing with erasing the quintessential humanness from intelligence. However, Turing is not erasing the human as much as he is disrupting what it means to be a thinking subject. And in doing so, Turing also disrupts the security of the humanist subject. In place of a humanist subject, he describes an early version of the posthuman subject. Hayles also describes “Computing Machinery and Intelligence” as a “primal scene” for the posthuman subject (xii). Before I continue to describe the posthuman subjectivity found in Turing’s article, let me define the distinctions between humanist and posthuman subjects. By humanist I mean a liberal,

atomistic, notion of humans as the authentic owner of a unique body and identity and the executer of unique will. This is the human that the enlightenment defined.

By post-human, I mean the subject who is always already embedded and constructed in relation to other humans, objects, technologies, institutions, and rhetorics. Hayles writes that the posthuman subject is first a foremost a notion of embodied subjectivity that is culturally and technologically embedded: “embodiment makes clear that thought is a much broader cognitive function depending for its specificities on the embodied form enacting it. This realization, with all its exfoliating implications, is so broad in its effects and so deep in its consequences that it is transforming the liberal subject, regarded as the model of the human since the Enlightenment, into the post human” (xiv). When Barad calls for a posthumanist performativity, she starts with her revised notion of agency, not as a thing which humans own and administer, but as a dynamic process of intra-actions. And these intra-actions are material-discursive practices, which are also rhetorical practices. The significance here is that agency is distributed between and among humans, non-human animals, and really the entire material, discursive world. The most significant shift here is that human life is not the only form of life that is active. Humans share active, constituting, and even discursive practices in relation and negotiation with “the world-body space in its dynamic structuration” (“Posthuman Performativity” 147). For Haraway, the posthuman subjectivity is ironic and tense but in that confusion tension she argues for the “cyborg as a fiction mapping our social and bodily reality and as an imaginative resource suggesting some very fruitful couplings” (149). This fruitful coupling that Haraway describes

resembles the chiasmic relations of bodies and discourse: both are tense, productive, and even overflowing.

Feminist Posthumanism

Braidotti, Hayles, and Haraway all theorize posthuman subjectivity while also recognizing the limitations of the posthuman figure. In Braidotti's analysis of posthuman subjectivity, she does want to find a way to use posthumanism as a critical interjection into ethics that accounts for human within a complex network of non-human actors and environments. However, she also very soberly recognizes that the post-human shift is also at the heart of advanced capitalism and bio-genetic technologies, which she addresses as a "perverse" and at times "inhumane" capability of the posthuman notion of subjectivity (4-5). Likewise Katherine Hayles is critical of the posthuman subject in so far as its discourse gradually ossified a notion of information and knowledge that is separate and transcendent from material and bodies. This is not a physical erasure. Rather, she identifies the rhetorical production of an epistemic commitment to information without matter. However, behind this discourse of disembodiment, Hayles always points towards the often-excluded bodies and material form. Haraway has been read as an overly naïve celebrator of posthuman cyborg subjectivity (e.g. Bordo 228; Wendell, 169). However, she does recognize the many ways that posthuman is tied systems of control and exploitation. For example, she writes, "Modern production seems like a dream of cyborg colonization work, a dream that makes the nightmare of Taylorism seem idyllic. And modern war is a cyborg orgy, coded by C3I, command-

control-communication-intelligence, an \$84 billion item in 1984's US defense budget” (149). In addition, Haraway identifies how cyborg subjectivity disproportionately intervenes women’s bodies and restricts women’s experiences and possibilities. Haraway’s cyborg is in a “pleasurably tight coupling” with both disruptive and controlling potentials (152). All of these texts analyze digital technology in relation to human bodies. From that analysis they reveal the significant political and ethical issues. In particular, they reveal the ways that technologies intersect with gender and politics of sexual difference.

For Braidotti, Hayles, and Haraway, post-humanism is a fact of our current social condition. Hayles writes that the machine in Turing’s test doesn’t even have to pass the test in order to establish post-human subjects. This test is from the beginning based on post-human presuppositions:

The important intervention comes not when you try to determine which is the man, the woman, or the machine. Rather, the important intervention comes much earlier, when the test puts you into a cybernetic circuit...in which represented bodies are joined with enacted bodies through mutating and flexible machine interfaces... no matter what identifications you assign to the embodied entities that you cannot see, you have already become posthuman” (Hayles xiv)

Simply the act of setting up the test—asking a human to judge intelligence based on questioning unseen subjects and reading text off of a computer screen—presupposes a post-human subject. For Braidotti, post-humanism is a fact of our current social conditions but it is also a shift that opens grey areas and “introduces a qualitative shift in

our thinking about what exactly is the basic unit of common reference for our species, our polity, and our relationship to the other inhabitants of this planet” (1). Haraway also identifies a posthuman subject, always interpolated with technology, throughout human history. Whenever tools, even language, structure the human experience, then pure, atomistic notions of humanism become contaminated with the construction from technologies, materials, and contingent historical contexts. And this interpolation opens possibilities: “The cyborg skips the step of original unity, of identification with nature in the Western sense” (150).

Although they all recognize the ways that posthumanism perpetuates and extends systems of human oppression, Hayles, Braidotti, Barad and Haraway all look for fissures or ruptures that are possible with posthuman subjectivity that were not possible with the notion atomistic, unified notions of human. These all find in the posthuman subject a grey area or an ambiguity that allows for the possibility of positive change. Braidotti writes that she has never been given access to this humanist self and has no nostalgia for its loss. Haraway writes that she would rather be a cyborg than to strive for the impossible ideal of goddess. It is surprising to me that Turing’s writing does not play a more central role in any of any of these discussions of posthumanism. Only Hayles even mentions Turing, and that is only in her prologue, which sets up the Turing test as an important moment of birth for posthuman subjectivity. Although he is never discussed in these feminist contexts, I believe that Turing may have been of like mind with Braidotti and Haraway: the computer intelligence, a kind of posthuman subject, opens up possibilities and new forms of thinking that did not replicate humanist definitions of intelligence, but rather

created alternatives. I am not attempting to anachronistically commit Turing to a feminist notion of posthuman liberation. However, we can extrapolate from “Computing Machinery and Intelligence” that Turing does define and also advocate for an alternative definition of human that merges gendered, fallible bodies with the computational thinking and machinery. Thus, Turing contributes to the destabilizing posthuman figure that connects human and technologies. His chiasmic rhetoric produces destabilizes humanist definitions of intelligence so that bodies, machines, and mind all overflow with significance beyond their siloed humanist definitions

The form of computing intelligence that Turing describes in this article challenges a humanist notion in which intelligence is defined as the sole property of humans. In particular, Turing’s chiasmic rhetoric extends this challenge by adding bodily difference to Turing’s intelligent machine. And that challenge was understood immediately, causing a sense of fear regarding Turing’s computer. Although Turing would not have called his notion of computer intelligence a posthuman subject, he did define this as a form of heresy against traditional notions of humanism (“Intelligent Machinery: A Heretical Theory”). And in this heretical theory of machine intelligence, Turing blurs the lines between human and machine terms that integrate the gendered, sexual, error-prone messy lives of humans into the too-often assumed sterile, purely logical work in computers.

Gendering Intelligence

What we find in this Turing’s chiasmic rhetoric discursively constructs a destabilizing relation between humans and machines. In particular, the relation between

bodies, humans, intelligence and technology is destabilized from a humanist notion by Turing's addition of feminine gendering. In Turing's article, not only are bodies and intelligence connected, in addition, femininity and intelligence are also dynamically related. In this article, we have a productive example of the blurring line. In particular, this unbalanced and ambiguous description is a place in which gender is the key to intelligence. Here, Turing femininizes not just a machine (this is not a fembot like what we see in *Metropolis*) but he also feminizes intelligence itself. He first genders this machine in feminine ways. He also by then identifies intelligence with the performance of tasks that are both masculine as well as feminine. Which is not to say that these tasks are gender neutral, rather, Turing genders intelligent machinery with an ambivalent tendency towards feminine as well as masculine tasks. The form of thinking that are traditionally associated as masculine—mathematics, rule-based tasks, logical proofs—these were tasks that Turing already knew that the machine could do. In order to prove its 'intelligence' Turing would need to also prove that the machine could perform modes of thinking that have traditionally been gendered feminine. The machine's access to intelligence hangs on its ability to be gendered feminine.

Chiasmic rhetoric produced at the intersection of these bodies (both machine and human) and Turing's text here certainly unstable. And that instability is a chiasmic rhetoric that lets us see the negotiating relation between gender and intelligence. Where as gender and intelligence are typically cleanly partitioned so as to seem naturally separate, Turing's article connects and relates the two in a way that is unique and also challenging to traditional notions of intelligence that excluded embodiment, emotion, and

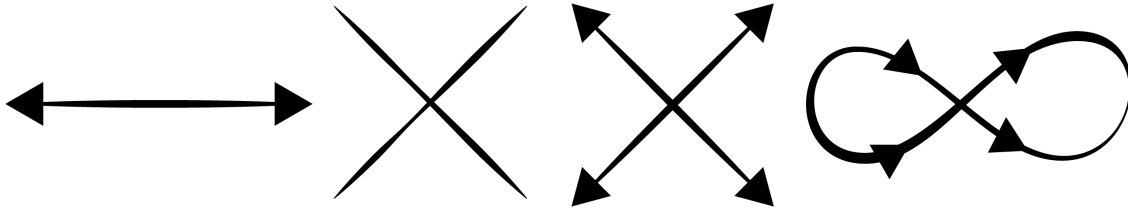
even women. In addition Turing's chiasmic rhetoric in "Computer Machinery and Human Intelligence" makes no pretense of naturalness or stability. Rather, the dynamic and unusual relation between gender and intelligence calls attention to the relationing performed in this text. In this off-balanced chiasmic rhetoric, we see feminizing intelligence as a crucial move for defining intelligence in machinery.

Throughout this chapter, I have wanted to find places in which Turing is not a passive victim. However, here as elsewhere, I cannot say that Turing decided or wanted to feminize intelligence as a subversive choice that disrupts humanist notions of intelligence. I don't think it was that simple or that deliberate. However, this result of his material-discursive performance in this text has produced rhetorical force that does disturb definitions of human and computer. In their reified articulations, our relations to bodies are barely perceptible. Bodies are ossified so that they are perceived as passive, natural, and permanent. Turing's writing disturbs this ossified because he articulates a strange and even disturbing relation between machines and bodies. In particular, he does this by gendering the machines. The effect is that machines move closer toward intelligence by also moving them closer towards the embodied, gendered, sexualized experience of humans.

At the same time, like Hayles, Braidotti, and Haraway, I also recognize that with this posthuman subject comes the possibility of being co-opted and controlled by the status quo. With time, that has been what has happened: gender was removed from the test and the computer was evaluated under more and more masculinized notions of intelligence like problem-solving, mathematics, and rule-based game play. Nevertheless,

in this article, we see a brief moment in which the relations between bodies and intelligence are disrupted by the chiasmic rhetoric of a man who took delight in composing this heretical argument. His composition process for “Computing Machinery and Intelligence” was apparently delightful. He wrote this quickly and read it back to his friend Robin Gandy. Gandy relates that Turing giggled in parts, smiling as he performed this text that was intended to solicit a strong reaction. Although this text has sense then been interpreted in more sterile ways, and although Turing may not have fully realized the impact of gendering machinery in this way, the text continues to exist as a place of negotiation and also as a place where Turing’s unique mind, body, and experience produce a chiasmic rhetoric that exposes a dynamic and re-forming relation between bodies and intelligence.

CHIASMUS 6:
COMPOSING THROUGH CHIASMUS



*“We can only see a short distance ahead,
but we can see plenty there that needs to be done.”*

~Turing

“We do not even know what a body can do.”

~Spinoza

Chiasmic rhetoric has been my heuristic and theoretical framework for analyzing relations between bodies and discourses. I have developed this notion of chiasmic rhetoric from theoretical work on feminism, gender theory, literary theory, and rhetorical figures. In the life and text of Turing, I have used chiasmic rhetoric in order to demonstrate that these relations are productive: they produce Turing as a subject and they produce Turing’s original knowledge and inventions. But this dissertation also began broadly with the always already connected relations between bodies and rhetoric.

My development of chiasmic rhetoric touches on notions of figuration—figures of flesh and figures of text—more broadly than Turing’s particular body and his particular texts. By broadly, I mean that the implications of this research engage with a larger set of discourses beyond Alan Turing’s body and text. My first introduction to theories of bodies and writing came through the embodied, lyric performance of Luce Irigaray. When we write, Irigaray claims, we are also composing our bodies within a system of sexual difference. However, the figure of writing is not passive or neutral towards all bodily differences and all embodiments. In *An Ethics of Sexual Difference* Luce Irigaray composes a performative critique of the phallogocentric forms of philosophical discourse. At once, she exposes the male embodiment and sexuality defining the norms and forms of writing and also uncovers the definitional exclusion of femininity on which these texts are composed. Irigaray was perhaps where I began, but my research has been informed by rich conversations on bodies and writing. For instance, Jean-Luc Nancy defines bodies as a *corpus*, which is composed anew with each touch between writing and flesh. Cixous urges women: “Write yourself. Your body must be heard” through poetics (880). And Cixous’ intersection between bodies and writing is also a politically subversive act that challenges patriarchal values and modes of composing knowledge. Donna Haraway also finds feminist leverage in the embodied point-of-views that allow for forms of ‘objective’ knowledge. She theorizes the bodies that ground objectivity in order to “insist on the embodied nature of all vision and so reclaim the sensory system that has been used to signify a leap out of the marked body and into a conquering gaze from nowhere...Feminist objectivity means quite simply situated knowledges” (“Situated

Knowledges” 581). In all of these texts and so many more that I could list, bodies and discourse intersect. In addition, those intersections between bodies and discourses produce knowledge. In addition, especially for feminists, these intersections are potentially disruptive. At the same time, these same interactions between discourse and bodies can punish, discipline, control and exclude bodily differences.

My dissertation research does not necessarily extend these discourses. Instead, this dissertation is built on the same epistemological commitments to the relations between bodies and texts. This dissertation is committed to the epistemological grounding that all knowledge is situated in particular embodied experiences and differences. Feminist scholars of science and technology, especially Haraway, Hayes, Fausto-Sterling, Keller, Hekman and others, have shown the many ways that bodies inform our knowledge production within scientific communities. This dissertation brings together these discourses in order to demonstrate how Turing’s particular embodied experiences and his particular texts intersect to produce his subjectivity and his knowledge. What is more, this dissertation extends these epistemological commitments into the rhetoric of science and technology. Chiasmic rhetoric forms our scientific and technical knowledge.

Chiasmic rhetoric is just one way to understand these relations. Chiasmus has productively aided me to theorize increasingly complex relations between bodies and discourse. In addition, chiasmus has created such a strong bond between bodies and discourse that this project has been able to demonstrate the ways that embodiment informs the writing and thinking of Alan Turing, who is often considered a disembodied

figure. However, chiasmus has its limitations. To begin, chiasmus only intersects two things. This reproduces a binary relation where a heterogeneous form may best suit the experience of embodiment. I have run up against this limitation multiple times in this dissertation research. For the most part, I've described chiasmus as the relation between bodies and discourse. However, I also use chiasmus to figure relations between bodies, identities, knowledge, and technologies. In order to fully describe the many relations that compose both Turing's body and his knowledge, perhaps chiasmus is still too simple. A more complex figure is still needed. Nevertheless, chiasmus is a starting point that has allowed for analysis of intersecting, dynamic, and destabilizing relations between bodies and discourse.

Uncovering Bodies

Chiasmic rhetoric allowed for a rich analysis through several moves of increasing complexity. I began with contrary antithesis, a relation of mutual exclusivity, in order to explain the relation that is typically constructed between bodies and writing. However, I used feminist theories and a close reading of Turing's text in order to demonstrate that this relation of antithesis could not be maintained: locations of overlap and connection were always present in the text. The first chiasmic move is to connect. As an X, chiasmus always connects. So too, bodies and discourse are inseparable, but also not collapsible into each other. Then chiasmus moved again to become dynamically productive. Both sides of chiasmus—the rhetorical figure as well as the figuring between bodies and discourse—enact force on each other. The result is that, by connecting, each side changes

the other. This is a process of co-constructing both bodies and discourses. Together, these bodies and discourses produce new knowledge and invention for Alan Turing. However, these are not simply productive co-constructions. This chiasmic interaction also disciplines and controls bodies. Finally, I turn the most active chiasmic movement: destabilizing. At this point the interactions between the two sides of chiasmus seem to overflow and exceed each other. In the case of Turing, we found that his gendering discourse exceeded beyond gendering of human bodies into the gendering of computers as well as feminizing intelligence itself. This moment is significant because, when bodies overflow to frame computer and intelligence, normative relations between bodies and technologies are destabilized. This destabilized relation was quickly sterilized by erasing the feminizing gendered discourse from the Turing test. Nevertheless, this chiasmic analysis brings gendering discourse to the forefront in order to argue that gendering and embodiment were central to Turing's thinking and writing.

From these movements of chiasmic rhetoric, we find bodies interesting with discourse in places where we may not expect to find bodies. This project finds the bodies that have always already been present in Alan Turing's texts. This chiasmic relations between bodies and discourse in of Alan Turing's writing revealed the rhetorically, epistemic, and inventive ways that Turing's body, the bodies in his text, and the bodies around his text all give shape to the his inventions and rhetoric. For instance, his experiences losing his friend motivated his initial thinking about cognition outside of human body. His physical experience solving mathematical problems informs his design of digital computation. And his experience as a disciplined subject of sexuality and

governmentality also inform his plan for training a computer and also his definition on what that intelligence could include.

Uncovering Bodies in the Rhetorics of Science and Technology

One of the primary contributions of this research is to the fields of rhetoric of science and technology. Within these fields, science is understood as a rhetorical activity out of which facts are constructed. The work of Bruno Latour is surely notable for its contributions towards how fact are constructed by people, in spaces, in relation to objects and institutions, disciplinary practices and values, as well as discursive practices (*Laboratory Life*). Facts are constructed within an entire network, which he calls the *circulatory system* of the larger *body* of knowledge production (*Pandora's Hope*). Scholars of rhetoric of science have long come to understand the significance of discourse for knowledge production (Bazerman; Myers; Campbell; Fahnestock). For instance, Boyd argues some theory constitutive metaphors are essential for science to translate between causal relations in the world to conceptual relations in language. For these metaphors, the rhetorical trope itself forms the knowledge of the theory or fact not-yet known. Gross makes a stronger claim that rhetoric is constitutive of scientific knowledge (*Rhetoric of Science*) although he hedges that claim significantly in his more recent publication *Starring the Text*. The rhetoric of science and also science studies more broadly have continually shown how our scientific knowledges are inseparable from the words, figures, forms, and strategies of composing science in discourse (Taylor). My research extends these discussions by demonstrating that the rhetoric of science is also as an

embodied rhetoric. This is especially significant because I am drawing from a definition of bodies developed by material feminism, in which our embodiment is always volatile, singular, and also co-constructed within power relations.

Because I argue that bodies are singular, we find that there are particularities and even peculiarities in Alan Turing's scientific rhetoric. For instance, Gross has demonstrated that the IMRAD (Introduction, Methods, Results and Discussion) presents an inductive process of scientific discovery (*Rhetoric of Science*; also see Penrose and Katz, *Writing in the Sciences*). This form sets the standard from presenting and developing scientific knowledge. However, Turing never once utilizes the IMRAD form in his scientific writing nor does he present his thinking as an inductive process. Rather, his style is unusual and even unprofessional by general standards. His articles most frequently begin with a proposition that he is seeking to develop or defend. For instance, he begins "Nature of Spirit" by asking about the relation between spirit and the body. In his report to the National Physics Lab, "Mechanical Intelligence," Turing opens by writing "I propose to investigate the question as to whether it is possible for machinery to show intelligent behavior" (410). Then he immediately addresses several common objections. He never presents data. Much of what he proposes is hypothetical, imaginative, and even personally significant. Likewise, in his most famous article "Computing Machines and Intelligence," Turing opens with the question "can machines think," then continues to propose the "imitation game" to define what it means to think. This is also highly imaginative and creative. Turing never conforms to the form of scientific writing. In addition, it is clear that his thinking is also peculiar. His inventions

and scientific theories are not inductive. Rather, they are deductive and often that deductive process starts from a personal knowledge.

Technical rhetoric is also notable for its characteristic style of *expediency*, which Katz identified in his analysis of Nazi technical documents (“Ethics of Expediency”). Katz not only identifies expediency as a key quality of Nazi ethics of technical writing; in addition, he finds that expediency is the defining ethic of technology itself. A third quality of technical and scientific writing is to maintain an objective, disinterested point of view. Certainly, since at least Francis Bacon, the distance between the scientist and the object of study must remain impassionate, objective, and disinterested. Turing, however, as I have described his work, is an exception to that rule. When we consider the relation between his embodied experiences and his technical writing, we can also begin to notice all of the ways that Turing is both inexpedient and also subjective: he writes imaginative tangents, he muses about hypothetical situations, he writes in first person, his theories are clearly informed by his personal experiences, especially his experiences being disciplined and trained through education.

By studying Alan Turing’s writing as embodied writing, I have explained his writing and thinking, which do not conform to the most significant expectations within his discourse communities, within the context of his unique life and singular embodied experiences. He lived and wrote in a way that resisted the expected forms. Most notably this is seen in relation to his sexuality. He was a homosexual man in the ultra conservative society of mid-20th century England, one that employed chemical castration as punishment and also a ‘cure’ for those found guilty. He was open about his sexuality.

What is more, even when he was arrested and tried, Turing refused to defend himself as he held a conviction that there was nothing indecent or criminal about his sexual behavior. More generally, he was also a peculiar man in his day-to-day life. Although elite British society maintained rigorous standards of etiquette and polite society, Turing seemed unaware or merely disinterested in many of these expected social graces. He was peculiar: he rode on a broken down bike, he tied his pants up with a rope, he never participated in social clubs, and was often sweaty or dirty while working in the laboratory, he said strange things, and never ceased to think of mathematics and computing machines. But he seemed committed to living his life in the way that suited his body, mind, and personality.

Also, given that bodies are always already composed within power structures and political networks, bodies also create an intersection between those power structures and the scientific texts. In this way, Turing's body forms a nexus between the scientific knowledge he composes and the power structures that co-construct his body. In particular, those power structures define and discipline bodies in terms of sexuality and gender. These gendered and sexual power dynamics shape Turing's body and they also shape the knowledge that Turing composes. In particular, power dynamics that define and regulate gendered norms also inform Turing's definition of artificial intelligence. However, Turing, in a typically-for-him queer move, uses these gendered norms to compose a disruptive notion of embodied intelligence that is both feminine as well as surprisingly humane.

Hence, my with this theory of chiasmic rhetoric, I have been able to contribute to the rhetoric of science by adding the complexity inherent in the interactions between bodies and discourse that together produce new knowledge. Although my dissertation focuses on the embodied composition of technical writing, the chiasmic interactions between bodies and discourse inform all writing. Therefore, the value of chiasmic rhetoric extends well beyond technical writing and into every composition, including the composition classroom.

Bodies in Composition

While we have studied bodies in composition theory for a very long time, I will point out some significant contributions that chiasmic rhetoric brings to the teaching of writing. In particular, scholars who want to leverage ‘the body’ in composition tend to privilege affect and embodiment as positive and productive. As we’ve seen from Turing’s writing, disciplinary practices that regulate and punish bodies also focus on bodily experiences and affect. Consider, for example, Sondra Perl as one writer who argued that composition must focus on bodies but who does not account for the ways that this attention to bodies can be both painful, disciplining, and controlling. Perl’s methods of writing with the body is built first and foremost on a need to create a protected space, a safe space, for a writer to explore her own interests, perspectives, and writing processes. Perl begins by addressing those scary moments of first starting a project. And her project is to design methods of moving beyond those scary moments toward comfortable composition. And for Perl, comfortable writing is the felt sense of embodied writing Once in a comfortable

space, writing with the body can start to flow. If we listen to her CD we hear “Breathe deeply, repeat the topic to yourself, sense into your body.” Moments later we hear “wait patiently for a word, a phrase”... then more peaceful silence. Through Perl’s process, a writer can access the knowledge of *felt sense* in our bodies that may have otherwise been repressed.

Peter Elbow, like Perl, begins by discussing the dissonance experienced in much writing: the frustration of getting stuck on the wrong word, the feeling of “nausea” when you’ve worked and worked on something until you can’t look at it any more. When free writing, our vernacular language can be used to free ourselves from the pain, discomfort, or blocks of more critical, self-conscious writing. As Elbow describes, can use our embodied sense to feel our way past this discomfort of writing. And that embodied sense, Elbow finds most of the time, is a sense that leads to good writing. While thought in Elbow’s work is trained and disciplined, eloquent language is described as a mother tongue, which is “kinesthetic, as though it is in the body” (*Vernacular Eloquence* 6). For Elbow we should use the naturalness and comfort of our speaking voices to ease the writing process towards comfort. In this notion of embodied writing, both the nausea of over working on a project and the pleasure of speaking naturally and comfortably are embodied writing. However, for Elbow, ideal writing the body is comfortable, natural, and fully engaging one’s body through speaking. This embodied writing is similar to the flow and freedom that Elbow associates with creative mode of writing in *Words of Power*. In this text, Elbow pairs the creative function of writing with the critical function as the two modes that allow for good writing. He separates these modes into the creative

intuitive mode of what “feels right,” which is associated with bodily, affective, and unconscious experience and knowledge (11). The other mode, the critical mode, he describes as “conscious awareness” or “conscious control” (11-12). These two modes reinforce and inform each other. Together, for Elbow, these modes compose good writing. The problem with this model is that it reinforces a binary between unconscious flowing body and conscious critical mind. The first feels good and natural. The second does the hard discerning work of judgment and critique. This overlooks the ways that our embodied knowledge is also conscious knowledge. In addition, our embodied intuition is always already controlled and disciplined.

In many ways Elbow’s theories have been both useful for improving my writing process and product. As a teacher, I have used Elbow and Perl’s theories to describe and develop writing processes when teaching composition. Both of these writers offer rich, useful methods of writing our bodies and writing eloquently. However, they are also leaving much of the complexity and ethical dimensions of embodied writing out of their description of the embodied, intuitive mode our writing process. In other words they preserve a portion of the writing process for us, as writers and teachers, that feels too positive, too easy, comfortable in writing.

Both Perl and Elbow are commonly associated, even though many challenge these associations, with what James Berlin identified as the expressionist theory composition pedagogy (“Contemporary Composition”). Berlin and others have critiqued this approach to composition pedagogy because it focuses so exclusively on the individual expression and lacks critical attention to the ways that what makes “good writing” good is always

already composed through political and social disciplinary practices. Given that bodies are composed and disciplined through power dynamics and political structures, our embodied mode of the writing process is just as culturally, politically, and socially informed as any other form of composition.

Bodies in Every Composition

Chiasmic rhetoric pushes us beyond these expressionist relations between bodies and texts. This approach to rhetoric assumes that bodies are always already intersecting with text. In addition, these bodies are not naturalistic. These bodies are heavy with the complexity of history, politics, culture, and discourse. To move towards this more complex relation between bodies and texts, I suggest we ask, “when are we not writing our bodies?” Perl and Elbow assume that we are *really* writing our bodies when we are in safe spaces, when we get out of our minds, and when we focus on our bodies, and when we more physically enact speech acts orally than through writing. Perl and Elbow both describe a process of writing bodies that requires accessing embodied writing through processes of clearing our minds, creating safe spaces, and speaking out loud in order to allow our bodies to drive writing instead of our analytic minds. Writing our bodies should be unencumbered by too much analytic thought so that our embodied experiences and embodied knowledge flow onto texts. This assumes that thinking is somehow separate or distinct from writing our bodies. It also assumes that writing our bodies is in some way the most natural practice of writing. Why should our bodies only play a significant role when we’ve cleared our minds and created safe spaces? If we reject a binary between

thought and emotion, mind and body, then we can begin to think about how to include bodies in composition pedagogy in a wide range of situation, or every situation.

We must presume that we are always writing our bodies. The chiasmus between bodies and discourse is always already intersecting. And this presupposition opens up embodied writing into all forms and processes of composition. After all, we can't write without our bodies. We can't think without our bodies. Given what I have reviewed from feminist philosophers, especially Lloyd, Gatens, Grosz, and many others, we know that embodiment is necessary aspect of our ontology. Our bodies are a precondition for writing. At the same time, our bodies do not exist before or beyond writing, waiting in some pure form to be conveyed through language. No, bodies are also constructed, disciplined, defined, and come into shape through language. This is the chiasmic interaction between bodies and discourse, which is an intersecting, interacting, dynamic and at times unstable relationship.

I want to suggest that writing our bodies is inherently rhetorical mode of writing. I do not write my full unique experience in every text I write. No one can communicate his or her full self on each page or writing or in each speech act. In addition, writing our bodies is in many ways pre-constructed as we only know our bodies in and through discourse and performance. Instead of writing our embodiment in its fullness, we rhetorically shape the bodies we write into text. We make choices about what we allow bodies to do in texts. And we make choices about what we write when we write our bodies and others' bodies.

This is not to say that we have full control or choice over our bodies or our writing. Our chiasmic rhetoric that intersects writing and bodies, like any rhetoric, is incomplete, partial, and not fully in our control. Concepts, experiences, epistemological frameworks, material affordances and limitations, and technologies of discourse and material: these all slip into our writing in unexpected and not-totally-controlled ways. All of these complex factors are inseparable from the chiasmus that integrates bodies and discourse. The anomalous ways that bodies slip into writing are as interesting and important as the planned, deliberate ways. Within technical writing, these bodies are almost always slipping in unintentionally. But those unintentionally embodied, subjective rhetoric in technical writing also help us to understand how the text functions rhetorically as well as what bodies the text may presuppose, exclude, or marginalize.

Chiasmic Pedagogy: Composing Bodies through Disorienting Composing

In classes, I aid students towards an awareness of their own embodied practices of composition by designing disorienting pedagogy. The word disorienting is specific here. I presume that students come into my classrooms already oriented towards language, composition, education, and rhetoric. They have learned their orientations through their previous experiences in classrooms as well as out of classrooms. Many times this orientation is that language is a transparent, neutral tool to communicate ideas. Other times, their orientation towards writing and rhetoric is that they hate writing or are bad at writing. Whatever the orientation may be, students are not aware that they have been oriented or disciplined through practices of composition. By *disorienting*, my

pedagogical practices call attention to their naturalized notions of writing and composition. By teaching *disorienting* practices, I also teach many alternative patterns, behaviors, relations, actions, and technologies for orienting ourselves and our bodies in composition.

In this disorienting pedagogy, I am looking for the opposite of what Elbow and Perl describe. They look for an almost natural, easy relation between bodies and composition. But chiasmic rhetoric at its best is always in tense negotiations. Elizabeth Grosz describes the relation between discourse and bodies as volatile. I use a pedagogical method that addresses how negative, stressful, dissonant, and even uncomfortable affect be an important method of engaging bodies in composition. Lynn Worsham wants writing to be not a form of learning, but unlearning. The goal of this unlearning “does not mean that writing produces ignorance; rather, it produces a sense of defamiliarization vis-à-vis unquestioned forms of knowledge” (101). Worsham calls for a defamiliarization in composing that allows us to see how we have been learned. I would call this form of learning a kind of disorientation. Additionally, I am informed by Kristie Fleckenstein’s notion of writing our bodies. Fleckenstein describes how somatic writing must negotiate between senses of immersion and emergence. This writing process “depends on the immersion of being-in-a-material-place and the emergence weaving throughout; it depends on the continuous hybridization of who and what and where we are. *I do not find it easy*” (298). The examples that she offers for somatic writing that emerges to disrupt corporal codes include the biographies of holocaust victims and describes this as the “ragged edge of necessity - the experience of hurt and betrayal, the insanity of cultural

stories contradicting physical experience” (293). I am not suggesting that all moments of discomfort in writing are necessarily political resistance. However, I am suggesting that these moments make us see our own performance or constructedness in relation to writing and rhetoric. While on the other hand, easy, comforting moments of composition may offer a false sense of naturalness.

How then, do I structure chiasmic rhetoric into my pedagogical practice? Because chiasmus is dynamic and even destabilizing, I use disorientation to call attention to the relations between our bodies and our compositions. In my classes, we work on 2 assignments at the same time. I define what qualifies as ‘good work’ for each assignment as opposite and even opposed to the other’s definition of ‘good work.’ Each project has its foil that requires the opposite set of skills. For instance, for the largest project, the research assignment, students write an article in Wikipedia at the same time as they write an opinion for the school newspaper.

These assignments are defined with drastically different audiences, genre, media, styles, and purposes. However, both are research projects on the same topic. In class, we alternate back and forth, often in class working for 30 minutes on one assignment and then 30 minutes on the other assignment. For instance, we may work to define and revise for ‘good style’ in Wikipedia then when we switch to do the same activity for the student newspaper students must re-orient their approach to style and revision.

This practice of switching discourse practices creates a change in the students’ orientation to language. They must stop the ‘natural’ flow of their writing and become more aware of how to create deliberate differences in sentences structure, word choice,

voice, and organization. Through this they experience how rhetorical choices ‘feel’ different. And students do comment on the disorienting feeling of switching between two different definitions of good writing. They write that this is uncomfortable, challenging, and requires a level of focus to switch styles. And that challenge is exactly the goal. This is a form of rhetorical flexibility that requires keen attention to the details of rhetorically effective composition.

However, this obviously does not by itself make the students more aware of their bodies in the composition process. In fact, it could be really confusing. They may struggle, but they may not realize why. In order to reflect on these changing practices of composition, I structure in a comfortable, reflective space for composition. Each week, in class, we spend time writing and sharing personal reflections on their own writing process, experiences, practices, and struggles. In this reflective writing assignment, students write about their writing. It is here that they begin to see their own discomfort and their own physical struggle to write. We talk about how we feel ‘at home’ in some kinds of writing, and distant or awkward in other kinds of writing. In this way, my disorienting pedagogy is not opposed to comfort and ease in writing. In fact, this reflection on the disorientation is essential to help students see when and how they feel comfort in language and when and how they feel uncomfortable in language.

Continued Destabilization

The point is not simply making our students uncomfortable. Instead, I want to help them to see that their bodies perform, feel, and experience differently to different practices of

composition. This suggests that our bodies are active in our composition processes. From this grounding, we can begin to discuss the ways in which their bodies have been trained to feel more at home in some writing conventions than in others. Ultimately, the goal is not to valorize discomfort over pleasure. Rather, the goal is to expand the ways that we think of bodies engaging in writing. More specifically, my approach to pedagogy seeks to recognize our bodies as they actively perform in all rhetorical situation and all composition processes.

Again, chiasmic rhetoric is just one place to begin understanding the relations between bodies and discourse. Likewise, disorienting pedagogy is just one method that I have begun to try. With this approach, I aid students to feel and reflect upon the ways that their bodies are active in the composition process, even with technical writing. Through disorienting pedagogy, I attempt to facilitate the final move of chiasmus towards destabilizing relations between bodies and discourse. By disorienting students and producing destabilizing relations between bodies and discourse, I work as a teacher and a scholar to make the bodies in our texts ever more visible and palpable. However, much more work needs to be done. I also need more time to think, act, and respond as a teacher. With each class I learn more from my students. With each new research project, I learn more about bodies and writing. As I continue to teach and continue to research, I know my thinking on chiasmic rhetoric and composing with chiasmus will change. At the same time, I also know that my embodiment and embodied knowledge will change. Only after more experience will I be able to fully integrate the insightful, persuasive, inventive, uncomfortable, and disciplining embodied knowledge into my pedagogical processes.

References:

- Agar, Jon. "Alan Turing, a Broken Heart & the Invention of the Computer." *SoundCloud*. 16 Feb. 2013. Web. 28 Nov. 2013.
- . *The Government Machine: A Revolutionary History of the Computer*. Cambridge: MIT Press, 2003. Print.
- . *Turing and the Universal Machine: The Making of the Modern Computer*. Cambridge: Totem, 2001. Print.
- Ahmed, Sara. "Open Forum Imaginary Prohibitions: Some Preliminary Remarks on the Founding Gestures of the 'New Materialism'." *European Journal of Women's Studies* 15.1 (2008): 23–39. Web. 28 Nov. 2013.
- Aristotle. *On Rhetoric: A Theory of Civic Discourse*. Trans. George A. Kennedy. Oxford: Oxford University Press, 2006. Print.
- . *On the Generation of Animals*. New York: Kessinger Publishing, 2004. Print.
- Asimov, Isaac. *Words of Science, and the History Behind Them*. Boston: Houghton Mifflin, 1959. Print.
- Austin, Gilbert, Mary Margaret Robb, and Lester Thonssen. *Chironomia: Or, a Treatise on Rhetorical Delivery*. 1st Edition. Carbondale: Southern Illinois University Press, 1966. Print.
- Bacon, Francis. *The Advancement of Learning*. New York: Modern Library, 2001. Print.
- Ballif, Michelle. *Seduction, Sophistry, and the Woman With the Rhetorical Figure*. Carbondale: Southern Illinois University Press, 2001. Print.
- Barad, Karen. *Meeting the Universe Halfway: Quantum Physics and the Entanglement of Matter and Meaning*. Durham: Duke University Press, 2007. Print.
- . "Posthumanist Performativity." *Material Feminisms*. Ed. Stacy Alaimo and Susan J Hekman. Bloomington, IN: Indiana University Press, 2008. 120–157. Print.
- Barbone, Steve. *Reader's Guide to Lesbian and Gay Studies*. Ed. Timothy F. Murphy. Chicago: Fitzroy Dearborn Publishers, 2000. Print.
- Bazerman, Charles. *The Languages of Edison's Light*. Cambridge, Mass.: MIT Press, 2002. Print.

- Berlin, James A. "Contemporary Composition: The Major Pedagogical Theories." *College English* 44.8 (1982): 765. Web. 1 July 2014.
- . *Rhetorics, Poetics, and Cultures: Refiguring College English Studies*. Anderson, SC: Parlor Press, 2003. Print.
- Biesecker, Barbara A., and John Louis Lucaites. *Rhetoric, Materiality, and Politics*. New York: Peter Lang, 2009. Print.
- Bolter, J. David. *Turing's Man: Western Culture in the Computer Age*. Chapel Hill: The University of North Carolina Press, 1984. Print.
- Bordo, Susan. *Unbearable Weight: Feminism, Western Culture, and the Body*. Berkley, CA: University of California Press, 1993. Print.
- Boyd, Richard. "What Is Metaphor a Metaphor For?" *Metaphor and Thought*. Ed. Andrew Ortony. Cambridge: Cambridge University Press, 1993. 481–533. Print.
- Braidotti, Rosi. *Metamorphoses: Towards a Materialist Theory of Becoming*. New York: John Wiley & Sons, 2013. Print.
- Breck, John. "Biblical Chiasmus: Exploring Structure for Meaning." *Biblical Theology Bulletin: A Journal of Bible and Theology* 17.2 (1987): 70–74. Web. 28 Nov. 2013.
- Bulwer, John. *Chirologia Or the Natural Language of the Hand, 1644*. New York: Kessinger Publishing, 2003. Print.
- Burke, Kenneth. *Permanence and Change: An Anatomy of Purpose*. Berkeley: University of California Press, 1984. Print.
- . *The Philosophy of Literary Form: Studies in Symbolic Action*. Berkeley: University of California Press, 1974. Print.
- Butler, Judith. *Bodies That Matter: On the Discursive Limits of "Sex"*. New York: Routledge, 1993. Print.
- . *Excitable Speech: A Politics of the Performative*. New York: Routledge, 1997. Print.
- . *Gender Trouble*. New York: Routledge, 1990. Print.
- . "Sexual Difference as a Question of Ethics: Alterities of the Flesh in Irigaray and Merleau-Ponty." *Bodies of Resistance: New Phenomenologies of Politics, Agency, and Culture*. Ed. Laura Doyle. Evanston IL: Northwestern University Press, 2001. 59–77. Print.

- Campbell, John Angus. "Darwin and the Origin of Species: The Rhetorical Ancestry of an Idea." *Speech Monographs* 37.1 (1970): 1–14. Web. 18 Apr. 2014.
- Cavarero, Adriana. *For More Than One Voice: Toward A Philosophy Of Vocal Expression*. Stanford: Stanford University Press, 2005. Print.
- . *Relating Narratives: Storytelling and Selfhood*. New York: Routledge, 2000. Print.
- Certeau, Michel de. *The Practice of Everyday Life*. Minneapolis: U of Minnesota Press, 1998. Print.
- Cixous, Helene. "The Laugh of Medusa." Trans. Keith Cohen and Paula Cohen. *Signs* 1.4 (1976): 875–893. Print.
- Cockburn, Cynthia. "The Circuit of Technology." *Consuming Technologies*. Ed. Eric Hirsh. New York: Routledge, 2003. Print.
- Copeland, B. Jack. "Narrow versus Wide Mechanism: Including a Re-Examination of Turing's Views on the Mind-Machine Issue." *The Journal of Philosophy* 97.1 (2000): 5–32. Web. 21 Sept. 2013.
- . *The Essential Turing*. Oxford: Oxford University Press, 2004. Print.
- Copeland, Jack. "Pardon the Digital Warrior?" *Huffington Post*. 19 Aug. 2013–19 Aug. 400. Web. 19 Feb. 2014.
- Corbeill, Anthony. *Nature Embodied: Gesture in Ancient Rome*. Princeton, NJ: Princeton University Press, 2004. Print.
- Corbett, Edward P. J., and Robert J. Connors. *Classic Rhetoric for the Modern Student*. Oxford: Oxford University Press, 1999. Print.
- Crowley, Sharon. "Body Studies in Rhetoric and Composition." *Rhetoric and Composition As Intellectual Work*. Ed. Gary A. Olson. Carbondale: Southern Illinois University Press, 2002. 177. Print.
- Davis, Debra Diane. *Breaking Up (At) Totality: A Rhetoric of Laughter*. Carbondale: Southern Illinois University Press, 2000. Print.
- Derrida, Jacques. *Spurs: Nietzsche's Styles*. Chicago: University of Chicago Press, 1979. Print.
- Descartes, René. *Meditations on First Philosophy: With Selections from the Objections and Replies*. Trans. Michael Moriarty. Oxford: Oxford University Press, 2008. Print.

- Descartes, René, and Stephen Voss. *The Passions Of The Soul*. Indianapolis: Hackett Publishing, 1989. Print.
- Diprose, Rosalyn, and Jack Reynolds. *Merleau-Ponty: Key Concepts*. Durham: Acumen, 2008. Print.
- Dyson, George. *Turing's Cathedral: The Origins of the Digital Universe*. New York: Random House, 2012. Print.
- Easlea, Brian. *Fathering the Unthinkable: Masculinity, Scientists and the Nuclear Arms Race*. New York: Pantheon Books, 1987. Print.
- Eddington, Arthur Stanley. *The Nature of the Physical World*. Ann Arbor: University of Michigan Press, 1958. Print.
- Elbow, Peter. *Vernacular Eloquence: What Speech Can Bring to Writing*. Oxford: Oxford University Press, 2012. Print.
- Elbow, Peter. *Writing With Power: Techniques for Mastering the Writing Process*. Oxford: Oxford University Press, 1998. Print.
- Engel, William E. *Chiastic Designs in English Literature: From Sidney to Shakespeare*. Farnham: Ashgate Publishing, 2009. Print.
- Espy, Willard R, and Henry Peacham. *The Garden of Eloquence: A Rhetorical Bestiary*. New York: Harper & Row, 1983. Print.
- Fahnestock, Jeanne. *Rhetorical Figures in Science*. New York: Oxford University Press, 2002. Print.
- Fausto-Sterling, Anne. *Myths of Gender: Biological Theories about Women and Men, Revised Edition*. New York: Basic Books, 2008. Print.
- . *Sexing the Body: Gender Politics and the Construction of Sexuality*. New York: Basic Books, 2000. Print.
- Fleckenstein, Kristie S. *Embodied Literacies: Imageword and a Poetics of Teaching*. Carbondale: SIU Press, 2003. Print.
- . "Writing Bodies: Somatic Mind in Composition Studies." *College English* 61.3 (1999): 281. Web. 29 Mar. 2014.
- Foucault, Michel. *Discipline and Punish*. New York: Random House Digital, Inc., 1977. Print.

- . *The Birth of Biopolitics: Lectures at the Collège de France, 1978--1979*. London: Routledge, 2010. Print.
- . *The Birth of the Clinic*. London: Routledge, 2003. Print.
- . *The History of Sexuality: An Introduction*. New York: Random House Digital, Inc., 1990. Print.
- Fraser, Nancy. *Unruly Practices: Power, Discourse, and Gender in Contemporary Social Theory*. 2nd edition. Minneapolis: University of Minnesota Press, 2008. Print.
- Gatens, Moira. *Imaginary Bodies: Ethics, Power and Corporeality*. New York: Routledge, 1996. Print.
- Glenn, Cheryl. *Rhetoric Retold: Regendering the Tradition from Antiquity Through the Renaissance*. Carbondale: SIU Press, 1997. Print.
- Gödel, Kurt. *On Formally Undecidable Propositions of Principia Mathematica and Related Systems*. New York: Dover Publishers, 1992. Print.
- Grayling, Chris. "Alan Turing Is 'a War Hero like Winston Churchill', Says Chris Grayling." *Telegraph* 48 Dec. 2013. Web. 12 Feb. 2014.
- Grint, Keith, and Rosalind Gill. *The Gender-Technology Relation: Contemporary Theory and Research*. New York: Taylor & Francis, 1995. Print.
- Gross, Alan. *The Rhetoric of Science*. Reprint edition. Cambridge, Mass: Harvard University Press, 1996. Print.
- Gross, Alan G. *Starring the Text: The Place of Rhetoric in Science Studies*. Carbondale: SIU Press, 2006. Print.
- Grosz, Elizabeth. *Space, Time and Perversion: Essays on the Politics of Bodies*. 1st ed. New York: Routledge, 1995. Print.
- . *Volatile Bodies: Toward a Corporeal Feminism*. Bloomington: Indiana University Press, 1994. Print.
- Grothe, Mardy. *Never Let a Fool Kiss You or a Kiss Fool You*. New York: Penguin, 2002. Print.
- Haigh, Thomas. "Actually, Turing Did Not Invent the Computer." *Communications of the ACM* 57.1 (2014): 36–41. Web. 18 Apr. 2014.

- Haraway, Donna. "Situated Knowledges." *Feminist Studies* 14.3 (1988): 575–599. Print.
- Haraway, Donna J. *Simians, Cyborgs, and Women: The Reinvention of Nature*. New York: Routledge, 2013. Print.
- Hayles, N. Katherine. *How We Became Posthuman: Virtual Bodies in Cybernetics, Literature, and Informatics*. Chicago, Ill: University of Chicago Press, 1999. Print.
- Heisenberg, Werner. *The Physical Principles of the Quantum Theory*. Courier Dover Publications, 1949. Print.
- Hekman, Susan. *The Material of Knowledge: Feminist Disclosures*. Bloomington: Indiana University Press, 2010. Print.
- Herek, Gregory M., and Eric K. Glunt. "An Epidemic of Stigma: Public Reactions to AIDS." *American Psychologist* 43.11 (1988): 886–891.
- Hilbert, David. "The Grounding of Elementary Number Theory." *From Brouwer to Hilbert: The Debate on the Foundations of Mathematics in the 1920s*. Ed. Paolo Mancosu. Trans. W. Ewald. New York: Oxford University Press, 1998. 266–273. Print.
- Hinsley, F. H., and United States Air Force Academy. *The Intelligence Revolution: A Historical Perspective*. Colorado Springs, Colo: Washington, D.C: U.S. Air Force Academy ; 1988. Print. The Harmon Memorial Lectures in Military History no. 31.
- Hodges, Andrew. *Alan Turing: The Enigma*. Princeton, NJ: Princeton University Press, 1983.
- Irigaray, Luce. *An Ethics of Sexual Difference*. Trans. Carolyn Burke and Gillian Gill. Ithaca: Cornell University Press, 1993. Print.
- . *This Sex Which Is Not One*. Trans. Catherine Porter and Carolyn Burke. Ithaca: Cornell University Press, 1985. Print.
- Jarratt, Susan C. *Re-Reading the Sophists: Classical Rhetoric Refigured*. Carbondale: SIU Press, 1998. Print.
- Jefferson, Geoffrey. "The Mind of Mechanical Man." *British Medical Journal* 1.4616 (1949): 1105–1110. Web. 15 Mar. 2014.

- Katz, Steven B. *The Epistemic Music of Rhetoric: Toward the Temporal Dimension of Affect in Reader Response and Writing*. 1st edition. Carbondale, Ill: Southern Illinois University Press, 1996. Print.
- . "The Ethic of Expediency: Classical Rhetoric, Technology, and the Holocaust." *College English* 54.3 (1992): 255. Web. 1 July 2014.
- Keller, Evelyn Fox. *Secrets of Life, Secrets of Death: Essays on Language, Gender, and Science*. New York: Routledge, 1992. Print.
- Kennedy, George A. "A Hoot in the Dark: The Evolution of General Rhetoric." *Philosophy & Rhetoric* 25.1 (1992): 1–21. Web. 15 Mar. 2014.
- Kerferd, G. B. *The Sophistic Movement*. Cambridge: Cambridge University Press, 1981. Print.
- Kittler, Friedrich. "There Is No Softwear." *Stanford Literature Review* 9.1 (1992): 81–90. Print.
- Kopley, Richard. "Chiasmus in 'Walden.'" *The New England Quarterly*, 77.1 (2004): 115–120. Print.
- Lang, Fritz. *Metropolis*. 1927. Film.
- Lanham, Richard. *Analyzing Prose*. 2nd edition. New York: Continuum, 2003. Print.
- Lanham, Richard A. *A Handlist of Rhetorical Terms*. Los Angeles: University of California Press, 1991. Print.
- . *The Electronic Word: Democracy, Technology, and the Arts*. Chicago: University of Chicago Press, 1994. Print.
- Lassègue, Jean. "What Kind of Turing Test Did Turing Have in Mind?" *Tekhnema* 3Spring 1996 (1996): n. pag. Print.
- Latour, Bruno, and Steve Woolgar. *Laboratory Life: The Construction of Scientific Facts*. Princeton: Princeton University Press, 2013. Print.
- Leavitt, David. *The Man Who Knew Too Much: Alan Turing and the Invention of the Computer (Great Discoveries)*. Reprint edition. New York, NY: W. W. Norton & Company, 2006. Print.
- Lloyd, Genevieve. *The Man of Reason: "Male" and "Female" in Western Philosophy*. Minneapolis, MN: U of Minnesota Press, 1993. Print.

- Lyotard, Jean-François. *Discourse, Figure*. Minneapolis: U of Minnesota Press, 2011. Print.
- Manning, Erin, and Brian Massumi. "Series Forward." *Semblance and Event: Activist Philosophy and the Occurrent Arts*. Boston: MIT Press, 2011. Print.
- McCorduck, Pamela. *Machines Who Think: A Personal Inquiry into the History and Prospects of Artificial Intelligence*. San Francisco: W. H. Freeman, 1979. Print.
- McLuhan, Marshall. *Understanding Media: The Extensions of Man*. New York: Routledge, 2001. Print.
- Merleau-Ponty, Maurice. *The Visible and the Invisible: Followed by Working Notes*. Evanston: Northwestern University Press, 1968. Print.
- Mermall, Thomas. "The Chiasmus: Unamuno's Master Trope." *PMLA* 105.2 (1990): 245. Web. 12 Feb. 2014.
- Moor, James, ed. *The Turing Test: The Elusive Standard of Artificial Intelligence*. Boston: Kluwer Academic Publishers, 2003. Print.
- Moravec, Hans. *Mind Children: The Future of Robot and Human Intelligence*. Boston: Harvard University Press, 1988. Print.
- Myers, Greg. *Writing Biology: Texts in the Social Construction of Scientific Knowledge*. Madison: University of Wisconsin Press, 1990. Print.
- Nancy, Jean-Luc. *Corpus*. New York: Fordham University Press, 2008. Print.
- Nye, Andrea. *Words of Power: A Feminist Reading of the History of Logic*. New York: Routledge, 1990. Print.
- Olson, Paul R. *The Great Chiasmus: Word and Flesh in the Novels of Unamuno*. West Lafayette, IN: Purdue University Press, 2003. Print.
- Parutakupiu. *Pictograms of Olympic Sports - Judo*. N.p., 2006. Web. 28 Apr. 2014.
- Penrose, Ann M., and Steven B. Katz. *Writing in the Sciences: Exploring Conventions of Scientific Discourse*. 3rd Edition. New York: Longman, 2010. Print.
- Pera, Marcello. *The Discourses of Science*. Chicago: University of Chicago Press, 1994. Print.
- Perl, Sondra. *Felt Sense: Writing With the Body*. San Diego: Boynton and Cook Heinemann, 2004. Print.

- Petzold, Charles. *The Annotated Turing: A Guided Tour through Alan Turing's Historic Paper on Computability and the Turing Machine*. Indianapolis, IN: Wiley Pub., 2008. Print.
- Plato. *Phaedrus*. Trans. Benjamin Jowett. Mobile Reference, 2008. Print.
- . *Republic*. Trans. G. M. A Grube and C. D. C Reeve. Indianapolis: Hackett Publishing, 1992. Print.
- Quinn, Arthur. *Figures of Speech: 60 Ways To Turn A Phrase*. New York: Routledge, 2012. Print.
- Quintilian. *The Institutio Oratoria of Quintilian*. Cambridge: Harvard University Press, 1922. Print.
- Rees, Mina. "Mathematical Sciences and WWII." *The American Mathematical Monthly* 87.8 (1980): 607–621. Print.
- "Dynamic, Adj. and N." *OED Online*. Web. 5 May 2014.
- Saygin, Ayse Pinar, Ilyas Cicekli, and Varol Akman. "Turing Test: 50 Years Later." *Minds and Machines* 10.4 (2000): 463–518. Web. 2 Feb. 2014.
- Schnelle, Helmut. "A Note on Enjoying Strawberries with Cream, Making Mistakes, and Other Idiotic Features." *Alan Turing: Life and Legacy of a Great Thinker*. Ed. Christof Teuscher. New York: Springer Berlin Heidelberg, 2004. 353–358. Web. 17 July 2014.
- Sedgwick, Eve Kosofsky. *Epistemology of the Closet*. Berkeley: University of California Press, 2008. Print.
- Seidler, Victor J. Jeleniewski. *Man Enough: Embodying Masculinities*. New York: SAGE, 1997. Print.
- Serlin, David. *Replaceable You: Engineering the Body in Postwar America*. Chicago: University of Chicago Press, 2004. Print.
- Sprat, Thomas. *The History of the Royal Society*. New York: Kessinger Publishing, 2010. Print.
- Taylor, Charles Alan. *Defining Science: A Rhetoric of Demarcation*. Madison: University of Wisconsin Press, 1996. Print.
- Turing, Alan. "Computing Machinery and Intelligence." *The Essential Turing*. Ed. B. Jack Copeland. New York: Oxford University Press, 2004. 433–464. Print.

- . "Intelligent Machinery." *Essential Turing*. Ed. B. Jack Copeland. New York: Oxford University Press, 2004. 395–443. Print.
- . "Letter to Mother and Father with Diagram of a Fountain Pen." 1 Apr. 1923.
- . "Nature of Spirit." Apr. 1932.
- . "On Computable Numbers, with an Application to the Entscheidungsproblem." *The Essential Turing*. Ed. B.J. Copeland. Oxford: Oxford University Press, 2004. 58–90. Print.
- . *Programmers' Handbook for the Manchester Electronic Computer Mark II*. Manchester: University of Manchester, 1944.
- . "Can Automatic Calculating Machines Be Said to Think." *The Essential Turing*. Ed. B.J. Copeland. Oxford: Oxford University Press, 2004. 58–90. Print.
- Turing, Sara. "Watching the Daisies Grow." Image. Apr. 1929.
- Vernant, Jean Pierre. *Myth and Thought Among the Greeks*. New York: Routledge & Kegan Paul, 1983. Print.
- Wendell, Susan. *The Rejected Body: Feminist Philosophical Reflections on Disability*. New York: Routledge, 2013. Print.
- Whitby, Blay. *Artificial Intelligence*. New York: The Rosen Publishing Group, 2009. Print.
- Wiener, Norbert. *The Human Use of Human Beings: Cybernetics and Society*. New York: Da Capo Press, 1954. Print.
- Wilson, Elizabeth A. *Affect and Artificial Intelligence*. Seattle: University of Washington Press, 2010.
- Worsham, Lynn. "Contending with Words: Composition and Rhetoric in a Postmodern Age." *Contending with Words: Composition and Rhetoric in a Postmodern Age*. Ed. Patricia Harkin and John Schilb. New York: Modern Language Association of America, 1991. 82–104. Print.