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Designing with Polyamory

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A dissertation
submitted in partial fulfillment of the
requirements for the degree of

Doctor of Philosophy

University of Washington

2024

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Program Authorized to Offer Degree:
Human Centered Design and Engineering

University of Washington

Abstract

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Design is, and has long been, mononormative. It focuses on couples, dyads, and traditional relationship structures that are often taken for granted as the norm. In this dissertation, I contribute techniques for inquiring about lived experiences of queerness and queer relationships with data from sensorially rich first-person and participatory design perspectives. Using sonic and tactile media to probe about lived experiences of the important but understudied relationship formation of polyamory, in this dissertation, I ask: how might we design with and within the contexts of polyamory and computing? The project uses a combination of autoethnographic design inquiry and participatory design to investigate personal data and its potential for exploring non-normative relationships and lived experiences of polyamory.

Moving from individual to participatory design inquiries, this dissertation presents the development of autospeculation. I define autospeculation as a design research method that uses reflections on personal data to access and analyze lived experiences of technology design. I use autospeculation at both the individual and community registers. Using such practices, I argue for sensorially rich engagements with personal data as catalysts for personally meaningful reflection and speculation. Findings from this dissertation include: 1) autobiographical reflections with one's own data can serve as a bridge between first-person

research and participatory design research, 2) zines and craft-based design kits can successfully introduce participants to ways of engaging their data and of doing autospeculation, and 3) design researchers and practitioners can, as demonstrated by this dissertation, attend to more diverse relationship forms.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

ACKNOWLEDGMENTS

First and foremost, I want to express my deepest thanks to my fabulous co-advisors, Dr. Daniela K. Rosner and Dr. Audrey Desjardins, for their care, mentorship, and encouragement. I sincerely feel lucky to have worked with such brilliant people as my advisors throughout my doctorate. Thank you for providing me with the rigorous and meaningful training in design that I sought after in my doctoral program. Thank you also for believing in me, my ideas, and my visions for how we might do more queer and queer-inclusive research in HCI and design. I would also like to thank the members of the Tactile and Tactical Design Lab (TAT Lab) for their camaraderie, friendship, and insightful feedback. TAT Lab has been a highlight of my doctoral experience because of the diversity of ideas, methods, and communities that it engages with. Finally, many thanks to Regina Yung Lee for her thoughtful feedback on my scholarship and for serving as my GSR.

DEDICATION

To the person who began this project.

Chapter 1
INTRODUCTION

Designing with Polyamory is an approach to design that takes into account polyamorous lifestyles, chosen family, and other new alternative family forms. It foregrounds the lived experiences of polyamorous people in order to design more just futures that account for the particulars of polyamorous lifestyles and chosen family. Furthermore, this dissertation features three chapters that each engage with polyamory and design from slightly different angles. Across these chapters, the design research methodology of *autospeculation* grounds reflection and speculation in personal data and lived experiences of polyamory.

1.1 Why Design with Polyamory?

Polyamory exists in sociotechnical systems, yet it is rarely accounted for. Instead, monogamy is assumed to be the norm in design and human-computer interaction (HCI). Feminist technoscience scholar Angela Willey points out in her book, *Undoing Monogamy*, that although monogamy has become institutionalized and naturalized by the scientific enterprise, "Humans are among a very small percentage of mammals described as monogamous" (Willey, 2016, p. 47). This totalizing description of humans as monogamous signals the erasure of polyamorous people from the category of "human" altogether. Polyamory is, by design, excluded from and ignored by sociotechnical systems due to mononormativity (Pieper & Bauer, 2005) in scientific, technological, and designerly knowledge production practices. Therefore, it is worthwhile to further investigate the relationship between polyamory and the design of sociotechnical systems in order to design more just systems. Furthermore, polyamorous communities practice various forms of fairness, accountability, and transparency that HCI and Design communities such as FAccT, DIS, and CHI are investigating through design re-

search. Design research methods include mixed method inquiries that explore social relations through designed interactions.

1.2 Dissertation Overview

This dissertation begins with a brief introduction to the topics and themes of the design space of designing with polyamory.

1.2.1 Chapter 2

In chapter 2, building on an autoethnographic study, I ask: *How might we autospeculate through first-person engagements with AI/ML technologies, retrieving personal data from other-tracking technologies, queerness, and queer temporalities in the home?*. Then, in section 2.2, I retrace the origins of first-person research methods in HCI and Interaction Design. Section 2.3 then expands on speculation as a methodology in HCI, laying the groundwork for the introduction of *Autospeculation* as a reflective and speculative design research method. Lastly, section 2.4 unpacks the extant literature related to polyamory in HCI and Design.

1.2.2 Chapter 3

Chapter 3 begins with a related works section in subsection 3.1, which traces the relevant literature related to probes and zines in design research. Section 3.2 the describes the "Designing with Polyamory" Directed Research Group (DRG), which spearheaded a longer, collaborative zine design process. The zine was made by polyamorous people for polyamorous people to engage in Autospeculation with their personal data and lived experiences of polyamory. Then, in subsection 3.3, I perform close readings of the *Polymap Zine* and *Polymap Zine Kit* as design artifacts. Finally, in subsection 3.4, I provide an overview of the surveys, interview, and design research activity prompts for the polymap zine kit deployment.

1.2.3 Chapter 4

Chapter 4 is focused on the deployment of the *Polymap Zine Kit* with participants from the Seattle area polyamory community. It begins with an introduction in section 4.1, which emphasizes the prevalence of mononormativity and heteronormativity in design. It also outlines prior work within and beyond HCI and design research that includes polyamory and/or polyamorous people within design research. Then, in section 4.2, more related work is presented in terms of two important areas: 1) polyamory and design, and 2) material elicitation and speculation. Next, in section 4.3 I describe the methods that were used to develop a craft-based toolkit for making visible often-invisibilized relationships through reflective and speculative practices of autospeculation with personal data. This section features subsubsections about the kit (4.3.1), data collection and analysis (4.3.2), as well as a table (4.1) of the participant breakdown. Section 4.4 documents the findings from the participatory design study, with subsubsections dedicated to unpacking participant responses (4.4.1), four concepts of relational movement (4.4.2) such as relationship timelines, relationship intensities, relationship futures, and relationship dynamism. Section 4.5 features a discussion in two parts: first, in terms of "Probing and Interviewing Couples," and then "Toward Emotion-Informed Design Research". Finally, section 4.6 is a conclusion that summarizes chapter 4 in terms of designing with polyamory: "In order to design in less mononormative ways, we must attune our research methods and toolkits to be more inclusive of alternative ways of loving and being loved".

1.2.4 Chapter 5

Finally, Chapter 5 focuses on the development of the technique of *autospeculation*. Section 5.1 provides an overview of speculative and autobiographical design in HCI with respect to data practices and important critiques of speculative design. It also outlines the main contributions of autospeculation. Then, in section 5.2, I provide an even deeper dive into the background of speculation and first person research in HCI and design. Next, in section 5.3,

I describe my methodological approach in terms of three registers of analytical work: solo analysis, autospeculation, and meta-analyis. Then, in section 5.4, I describe four reorientations through autospeculation: taking from within (5.4.1), hyperlocal speculation (5.4.2), committing to slowness and depth (5.4.3), and near-past intimacies. Then, in section 5.5 I depict the opportunities and struggles in autospeculation. In section 5.5.1 I identify two generative tensions: the risks of revisiting and polyvocality. I then unpack these tensions in relation to one another, and end with a reflection on how HCI scholars might use this to cultivate a greater concern for questions of position within autospeculation. Section 5.6 is a conclusion to the autospeculation study, wherein I summarize the key findings of the development of autospeculation as a design research technique. The following section, section 5.7, provides new insights about autospeculation from recent studies, which were features in chapters 3 and 4. Finally, I end the dissertation with a framework for design with and for polyamory in section 5.8.

Chapter 2

SONIC TECHNOLOGIES OF A QUEER BREAKUP

2.1 Introduction

Imagine you're listening to an audio recording [1]. You hear a waffled ringing at two pitches, one low and one high, repeating in quick succession three or four times. Then a middle pitch drops into the mix, looping until the listener begins to feel uncomfortable. A softer voice interjects: "Thanks, Alexa. Alexa- Thanks, Alexa. Alexa-" repeating four or five times until the speed of the ringing increases and then stops. Thanks, Alexa," the voice states one final time, all on its own.

Listen closely to this clip and it might sound like a dreamscape: a voice assistant ignoring a user; a voice assistant overpowering a voice command; a background drumbeat for a movie score. A sound clip like this might be compared to noise music, a mode of challenging the musical, stretching what we might hear inside an audio track and characterize as melodious or tuneful. Pay more attention, and it might sound like a scattering of glitches, a mixing together of the left-over audio, the mistakes and defective bits recorded from interactions with a particular smart technology.

The above sound clip is all those things and more. It's a remixed version of sound recorded by the Amazon Alexa and labeled "Audio was not intended for Alexa." A sound clip of someone saying "thanks, Alexa" seems like it would be considered "for" Alexa. But the transcript from Alexa says otherwise—no transcription of the utterance exists. According to Alexa, the "thanks" was not intended for the device. What makes a voice assistant application not recognize a speaker as talking to it? The above sound clip responds to this

[1] This chapter was written in collaboration with Daniela K. Rosner and Audrey Desjardins and was published in Designing Interactive Systems 2022 (Kinnee et al., 2022). You may listen to this clip in the supplementary materials in the ACM Digital Library.

curiosity by stringing together examples of audio with the same "not intended" label within a single audio file. The resulting remix extenuates the contrasting types of overlooked sounds and allows a close listener to notice the intentionality in the speaker's voice.

This chapter describes a project I did in collaboration with Audrey Desjardins and Daniela K. Rosner. This project was my first encounter with first person methods and with investigating queerness in relation to technology and personal data. This chapter is the basis from which the following chapters grew–from first person research oriented on my own experience to autospeculation with other people.

In my project, and in the chapter that follows, I use this clip and others like it to explore questions of queerness, 'smartness,' and social connection. My design inquiry involves a process of listening to voice assistant recordings and learning to notice the unintended and under-explored moments they describe. It began with the observation that the Amazon Alexa voice assistant wasn't able to keep track of queer voices, confusing one voice for another. This simple observation led to a lengthy investigation of what kinds of queer experience the voice assistant does and does not encode through the medium of sound and their consequences for everyday life. Within this inquiry, I explored how using Alexa in queer relationships, across multiple partners and multiple homes, changes what kinds of encounters (practical, emotional, instrumental) the voice assistant opens up and forecloses.

This chapter sits at the intersection of several conversations within design research and adjacent fields of human-computer interaction (HCI) and computer supported cooperative work (CSCW). These fields have separately investigated topics of queerness, domesticity, and sound interaction. But they have only begun to examine their intersections—examining the potential of using sound to tell stories about technology that "theorize and produce new knowledge through listening practices," as Pedro J.S. Vieira de Oliveira explains (de Oliveira, 2016). Within these developments, HCI researchers face an uphill struggle. Working with sound is challenging; it can be difficult to analyze collectively; and it can be difficult to represent with text and image. To be sure, you may be experiencing this challenge as a reader of this chapter now.

To investigate and further probe the potentials of sound and technology, this chapter describes a combined autoethnographic (Duncan, 2004; Ellis et al., 2011) and design inquiry (D. K. Rosner, 2018a) of a queer breakup mediated by two Alexa devices in two homes over nine months [2]. I detail the process of downloading transcripts of my two Alexa devices and using dialogical exchange with audio experimentation to analyze my data. Informed by and extending prior work (Cho, 2019; Edwards & Sanoubari, 2019; Lau et al., 2018; Seymour, 2018; Strengers & Kennedy, 2021), I focus on the sonic—any phenomena or experiences relating to sound. In particular, I ask: What kinds of sounds aren't noticed by users but are noticed by voice assistants? What kinds of sounds aren't noticed by voice assistants but are noticed by users? How might smart technologies offer an alternative perspective on everyday queer experiences? Like prior work on sonic fiction and design inquiry (de Oliveira, 2016; Schulze, 2020), I am interested in phenomena that other experiential modes of inquiry (ethnographic, participatory, documentary) tend to miss or neglect. The chapter that follows begins with these questions to explore what potentials for life, love, and everyday experience voice technologies hold. It does not offer an answer to the questions, nor does it seek to 'improve' the voice assistant interface with universal or design-oriented recommendations. Rather, I theorize technologically-mediated lived experience, and queer lived experience in particular, through the lens of listening. While this chapter's emphasis is on experiencing personal data via sound and listening, chapters 3 and 4 emphasize tactile modes of engaging with personal data through materializing relationship formations. This dissertation presents an arc from sonic to tactile design interactions with personal data across its chapters.

My analysis and experimentation make two central contributions to design research. First, I contribute to debates on language within voice assistant design to suggest opportunities for people to reflect on sonic data, label their own experiences, and express varying shades and forms of queerness. This adaptive work involves a process of audio experimentation that uses close listening to investigate domestic technology, especially within some

[2]Because this project was conducted in collaboration, at times I use 'we' to refer to and represent our collaborative design research practice.

of the most intimate and hard-to-reach spheres of technological life. Second, I expand conversations on culturally-informed voice assistants to consider the heterogeneity of queerness and the impossibility of fully encoding polyvocality. This insight recognizes the design of queerness-informed voice assistants as connected with a process of bounding what it means to be queer. Across this work, I discuss opportunities for design researchers to grasp the particulars of queerness, understand bias in assistance, and comprehend what kinds of futures for domestic technology design are desired and by whom.

2.2 Background and Related Works

The study of sonic technologies and queer heartbreak comes out of three connected bodies of work at the intersection of digital sound studies, theories of queer temporality, and digitally-mediated intimacies in design and HCI. Below I review each of these areas, with a focus on the particular questions they raise for design research.

2.2.1 Digital Sound Studies

Sound studies is part of a broader field of sensory studies that emphasizes the entanglement of senses (Le Breton, 2017; Pink, 2015). Research on and through sonic technologies focuses on material engagements with a range of auditory phenomena, from noise and music to stuttering and silence (Pinch, 2008; Pinch & Bijsterveld, 2004, 2012). While the visual and discursive have long dominated social studies of technology, sonic developments mark a turn toward the senses and a wider engagement with practices of listening. As the late Trevor Pinch and Karin Bijsterveld (Pinch & Bijsterveld, 2004) remind science studies scholars, "fax machines, computers, printers, and photocopiers hum and beep; solutions gurgle; tea and coffee bubbles; radios play in the background; and ambient noise is everywhere [. . .] We who enter the laboratories to observe must also be prepared to listen."

Understanding sounds as integral to technological developments means examining not only their production and use but also their role in interpretations. Studying the setting of oceanography, for example, scholars follow how sonar, a sound-emitting technology, fun-

damentally reshapes the analysis of a seascape by introducing new modes of measurement and detection (Pinch & Bijsterveld, 2004; Thompson, 1995). In computing history, scholars trace the influence of musical keyboards on the design of the computer keyboard and mouse (Bardini, 2000; Pinch & Bijsterveld, 2004) and the influence of stethoscopes on the design of headphones and other contemporary modes of private listening (Sterne, 2003). Sound technologies have subtle but notable impacts on our modes of listening and even other sound technologies.

When Murray Schafer first introduced the idea of the soundscape in the 1970s, he argued that "electroaccoustically produced sounds" cannot be separated from the particular machines that made them (Pinch & Bijsterveld, 2004; Schafer, 1993). This link between soundscapes and the technologies that make them possible lives on in the work of HCI. Of late, HCI scholars have explored sound as a means of enhanced sensory engagement and creative expression, expanding tools of civic organizing and embodied performance with a wide-ranging digital implications (Chamberlain et al., 2017; Fosh et al., 2013; Hazzard et al., 2015)—from user interface design to machine learning (Fiebrink & Sonami, 2020).

Across this work, auditory language technologies such as voice assistants present a particularly potent example. Mapping digital encounters that invite close listening, scholars analyze the accent and speed of the chatbot speaker (Benjamin, 2019; Bragg et al., 2021; Daugherty et al., 2020; Guo et al., 2020; Whittaker et al., 2019); issues of privacy, trust and surveillance around the gendered, racialized encounter with the voice assistant user (Cho, 2019; Edwards & Sanoubari, 2019; Lau et al., 2018; Seymour, 2018; Strengers & Kennedy, 2021); the consequences of voice anthropomorphism on trust, sentiment analysis, and user interpretation (Seymour & Van Kleek, 2020); the everyday audio interactions and interjections around voice assisted home life (Ammari et al., 2019; Bentley et al., 2018; Porcheron et al., 2018); and the role of speech interfaces in hands-free collaborative practices such as medical surgeries (Austerjost et al., 2018; Massaroni et al., 2018).

Responding to this variety of concerns, design researchers and artists have sought to invert and subvert modes of auditory "assistance" by exposing the mechanisms of data

extraction they both enable and obscure (Cambre et al., 2020; Crawford, 2021; Crawford & Joler, 2018; Desjardins, Psarra, & A. Whiting, 2021; Lee et al., 2021; McCarthy, n.d.; Nicenboim et al., 2020; Parviainen & Søndergaard, 2020). Others have drawn a straight line between decolonizing design traditions and emerging forms of sonic fiction (de Oliveira, 2016; S. Goodman, 2009; Schulze, 2013). By experimenting with the device's form and situation, they have recorded sounds of infrastructure ("NYCityNoise", Accessed: April 27, 2024; The Sounds of New York City (SONYC) Project, Accessed: April 27, 2024) and exposed the sonic rhythms of translation interfaces (Judd, 2019).

My work most closely aligns with this latter strand of work in its experimental and critical approach. But where prior work emphasizes speculative design and use, I focus on speculative analysis—imagining new design directions through hermeneutic experimentation. I use lived and experimental encounters with a voice assistant as a means of revising and augmenting our tools of empirical inquiry and interpretation, with particular attention to important but under-examined questions of queerness within designed interactive systems. In some cases, I used device encounters to reflect on my everyday lived experiences (e.g. section 2.4.1). In other cases, I probed the edges of the device through data remixes and imaginative sketching (e.g. section 2.3.3).

2.2.2 Queer Temporalities

My study of queerness and design grows from a particular concern for questions of voice and historicity that undergird the study of sociotechnical phenomena. Extending a strong tradition of queer theory, technology scholars have explored the particular ways queerness operates across temporal registers, connecting the past to the present and the imagined future to the here and now (J. Halberstam, 2011; Muñoz, 1996; Sedgwick, 1983). This work involves a refusal of linear timelines and solutionist narratives (Muñoz, 2019a; Sedgwick, 1993), but also a consideration of how theorizing itself reflects particular concepts of time (Chambers-Letson, 2018; J. J. Halberstam & Halberstam, 2005; Keeling, 2014; Muñoz, 2020). Sometimes timely and other times deferred, queer theorizing has reckoned with its

complicity in erasures and struggled with its enmeshment in what has come before.

Within HCI, this reckoning has surfaced in a small but consequential body of work concerned with algorithmic relationships to gender and queerness. Building on feminist HCI scholarship and its attention to embodiment and pluriversal subjectivities (S. Bardzell, 2010), scholars study the erasure of queer bodies by airport scanners (Costanza-Chock, 2020) and ML facial recognition systems (Scheuerman et al., 2020). Other work has explored the queering of HCI (DeVito et al., 2020; Spiel et al., 2019) through projects that center a diversity of queer experience, including coming out narratives (Dym et al., 2019), the safety of non-binary people of color (Starks et al., 2019), and the development of trans technology (Elwood, 2021; Haimson et al., 2020, 2021). Across this scholarship, queerness works as an analytic thread for examining how and why technologies so often fail (J. Halberstam, 2011) but still contribute (albeit unevenly) to the conditions for queer flourishing (Bonhomme, 2021).

I take particular inspiration from this paradoxical positioning of technological development within queer life. Where existing work has emphasized the widespread societal toll of algorithmically encoded bias on queer subjectivities, I look to their situated and generative potential. I wonder how glitches and oversights might lend themselves to alternative readings of voice assistants and queer life. Examining this potential while recognizing hardship takes exposing some of the most personal and mundane aspects of queerness, beginning with intimate relationships.

2.2.3 Queer Use and Intimacy by Design

HCI has long grounded the study of intimacy in the development of technology to support human connection—whether by elevating physical contact and care (Baishya & Neustaedter, 2017; Pan et al., 2017) or nurturing emotional expressivity (Lottridge et al., 2011). Early research on technology design and intimacy, such as Strong and Gaver's Feather, Scent, and Shaker, focuses on measuring feelings of awareness and closeness across remote couples' interactions and amplifying engagements through tangibility (Lottridge et al., 2011; Strong,

Gaver, et al., 1996) and augmentation (Perner-Wilson & Satomi, 2009; D. K. Rosner & Ryokai, 2010). In this work, closeness emerges at the intersection of data records and mundane encounters, suggesting that interpersonal meaning and feelings of intimacy grow not from special events as much as what Lottridge, et al. call "empty moments" (Lottridge et al., 2009).

Sound offers an especially fruitful line of intimate inquiry, opening questions around bodily engagement with and through connected devices. Work by Gopinaath Kannabiran, Shaowen Bardzell, Elizabeth Goodman, and others has examined the development and marketing of sex toys (J. Bardzell & Bardzell, 2011; E. Goodman & Vertesi, 2012; Kannabiran et al., 2011), with particular attention to the dynamics of arousal, sexual desire, and data privacy mediated by sound-based networked sensors (Eaglin & Bardzell, 2011; Kannabiran et al., 2018; Tanenbaum & Tanenbaum, 2018). Technology historian David Serlin, for example, examines the Enby sex toy designed for queer and non-binary users, and people with physical impairments like rheumatoid arthritis (Serlin, 2023). With the Enby, Serlin points to a post-unisex design stance that resists conventional forms of heteronormality and ablism to emphasize environmental sustainability, flexibility, and unintended use — or queer use, to use Sarah Ahmed's term (Ahmed, 2019, p. 201).

Queer use presents a potent conceptual anchor for our work. In *What's the Use?*(Ahmed, 2019), feminist cultural theorist Sarah Ahmed develops queer use as an oblique potential, a chance to explore "how things can be used in ways other than how they were intended to be used or by those other than for whom they were intended" (Ahmed, 2019, p. 44). As a mode of reuse or making-strange, it describes a method of working across historical and contemporary timeframes to find unexpected connections, orientations, and perversions—deviating from the "straight path" associated with compulsory heterosexuality and the ableist, gendered, and racializing norms such expectation-setting holds (Ahmed, 2019, p. 201). Where design research on intimacy has begun to examine queerness and multi-partner dynamics, scholarship on flexible and queer use has only begun to explore potentials of intimate design. Informed by David Serlin (Serlin, 2023), my work on voice assistants in the home

connects these two traditions around queerness and intimacy. Aiming to resist a focus on queer-phobic and couple-centric domesticity, I emphasize non-normative family structures and multi-partner communication patterns around sonic technology. I explore how interactions with voice assistants set new design routines in motion, beyond the tactile or visual.

2.3 Methods

2.3.1 First Person Methods and Autoethnography in HCI

This work is grounded in an autoethnographic design inquiry of my everyday experiences with Alexa over nine months. After conducting an autoethnographic engagement of living with sonic technologies, and alongside dialogues and exchanges between all three researchers (myself, Daniela K. Rosner, and Audrey Desjardins), we then designed audio experiments as a way to dive into our analysis. This process includes the development of audio experiments as creative entry points into data analysis, which I discuss further in section 2.3.3 below.

First person methods, like autoethnography (Duncan, 2004; Ellis et al., 2011) and autobiographical design (Neustaedter & Sengers, 2012), are qualitative research methods that position the researcher as the subject of inquiry. In this case, the researcher is observer, active participant, and at the center of the phenomena studied. Through firsthand experiences, the researcher observes, reflects, and builds insights. By nature, first person methods "acknowledge and accommodate subjectivity, emotionality, and the researcher's influence on research, rather than hiding from these matters or assuming they don't exist," according to sociologist and autobiographer Carolyn Ellis and colleagues (Ellis et al., 2011). In HCI, the methods have been used to study one's experience of a subculture or group, one's relationship to a technology, as well as one's experience in designing, prototyping and testing new technologies (e.g. (Cain & Trauth, 2017; Desjardins & Ball, 2018; Helms, 2021; Homewood et al., 2020; Lucero, 2018; Mackey et al., 2017; Neustaedter & Sengers, 2012; Spiel, 2021)). While still new to HCI, first person methods have drawn HCI researchers' attention to an important range of experience, including slow and long-term phenomena, personal

and difficult topics, and the researcher's presence, positionality, and presence in a research project. Furthermore, as this approach gains traction, design and HCI scholars have pushed for deeper engagements towards rigor, validity and recognition of the method as a way to respond to the shortcomings of the method (often cited as the small sample size and the challenges around bias). For instance, recent workshops (Mackey et al., 2017), as well as a TOCHI special issue have focused directly on strengthening discussions around the method and establishing best practices (Desjardins, Tomico, et al., 2021).

In past HCI works, autoethnography and first person methods have been used to investigate difficult, personal, or taboo topics such as the body (Helms, 2021; Homewood et al., 2020), (non-binary) gender (Spiel, 2021), failure (Howell et al., 2021), sexual orientation (Cain & Trauth, 2017), and difficult experiences (Devendorf et al., 2020). Along these lines, first person methods are particularly well suited to study home devices and queerness as they allow for reflections on intimacies with technologies and the self, and are open to long and intertwined temporalities of queer lived experiences.

With first person research roots in the social sciences (with autoethnography), writing has often been a central tool for reporting on first person experiences. Ellis, Adams, and Bochner discuss writing as a tool that "produces aesthetic and evocative thick descriptions of personal and interpersonal experience" (Ellis et al., 2011). As more design and HCI researchers start to take on this methodological stance, new design-oriented ways of engaging with and of reporting on first hand experiences have also recently emerged such as design memoirs (Devendorf et al., 2020) and through intersections with speculative design (Helms, 2021) and creative media production (H. R. Biggs et al., 2021). In addition to using writing as a tool, I engage in audio experiments as a way to make sense of my data. I detail my audio experiments below in section 2.3.3.

Further developing our methodological approach, our project includes a collaborative engagement between myself and Rosner and Desjardins (the co-authors on the published paper that preceded this dissertation chapter). Inspired by some tenets of duoethnography (Norris et al., 2016; R. D. Sawyer & Norris, 2012), I was interested in using dialogical

exchange as a starting point to analyze my data. Complementing duoethnography (Garcia & Cifor, 2019), where both researchers use their first-hand experience of the phenomenon, we used first-hand storytelling, collaborative annotations of data, and audio experiments that allowed us to discuss the project as a group. Because we focused on exploring my personal data, I had to be vulnerable and open with my collaborators throughout the project. As described in chapter 5, this meant frequently checking in about the intensity of the work, taking breaks if and when needed, and sometimes sharing difficult experiences. Throughout the project, my collaborators kept an openness and generosity that supported me to continue sharing my experiences, following some guiding principles from duoethnography: "the intent [is] not to profess but rather to learn and change as the result of the conversation" (R. Sawyer & Norris, 2015).

Before I detail our process and analysis in section 2.3.3, I first offer some biographical notes about my engagement with Alexa.

2.3.2 Biographical Notes

I am a queer, nonbinary person. I use the pronouns "they/he" or "he/him," and often abbreviates my pronouns as "they/he". Professionally, I am a PhD Candidate at the University of Washington in Seattle, WA. I lived the majority of my life as a cisgendered male, and began living as an "out" queer person in my early adult years. Earlier in life, I identified as a gay man, but in my early twenties, I began to understand myself as a member of the Queer, Nonbinary, and Gender Non-Conforming (GNC) communities. As this shift occurred, I began encountering moments when the designs of interactive systems were or were not sensitive to queerness or queer ways of living.

As I became further entangled within queer communities, I noticed that many technologies were not designed with aspects of queerness in mind. During the time of the study, I had relationships with my partner of five years (Warlock) and with a boyfriend of roughly

three months (Michael) (we are using pseudonyms for anonymity)[3]. I was in two concurrent, consensual, and separate relationships with both Warlock and Michael (Fern, 2020). This non-monogamous, queer relationship formation is often referred to as a "Vee" or a "V-shaped" relationship because one person interacts independently with two other people. Both Warlock and Michael consented to be a part of the polyamorous relationship formation, and both were aware that I was involved in separate, but concurrent relationships with both of them. Warlock and Michael never met each other, and they were never intimately or romantically involved with one another.

Upon beginning my experiments of living with voice assistants in my home, I felt excluded by the designs of voice assistant technologies that would confuse the voices of queer people. I feared the potential for these technologies to target and/or profile queer people in their own homes. I also noticed that many domestic technological systems struggled to account for and interact with people with multiple partners–often divulging information to all parties involved, or in some cases the wrong person, when the message was intended to be between just two partners. Therefore, my explorations of living with Alexa were largely motivated by concerns over privacy and security around queer people's data in the home.

This chapter is specifically looking at my interactions with Alexa from May 2021 until December 2021. I had not lived with an Alexa prior to this study, and installed it in the living room/kitchen of their microstudio apartment in Seattle in early March 2021. In early May 2021, I experienced a breakup.

2.3.3 Data Collection, Analysis, and Audio Experiments

By default, Amazon Echo devices keep an ongoing archive of user interactions, including the audio recording of utterances, a transcript of utterances, timestamps, Alexa's response, as well as additional metadata.

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[3]I note here that while I use the terms 'partner' and 'boyfriend' in this paper as a means to clarify who we are referring to, these labels are not representative of the fullness of the relationships with Kinnee. I interchangeably use 'partner' with 'Warlock,' and 'boyfriend' with 'Michael'.

For this work, I look at data across nine months (April-December 2021) and focus on data from May 2, 2021 to May 26, 2021, as these weeks span the period directly after my breakup. While most of my analytical work focuses on this three-week period, I also weave in salient and important data points from before the breakup and in the long tail of the breakup, until December 2021 (at the moment of writing).

In September 2021, using the Amazon Alexa website, I manually copy-pasted the recorded transcripts of their interactions with Alexa from early to end of May 2021. I then pasted the data in a spreadsheet. While other voice assistant systems like Google Assistant allow for easier access to voice data, at the time of the study, Amazon allows users to see their data or listen to it, but doesn't offer an interface option for downloading all the data easily.

In a collaborative effort, we (myself, Daniela K. Rosner, and Audrey Desjardins) read through and annotated the spreadsheet. Annotations focused on teasing apart intimacies of a queer break up, through the lens of a voice assistant's understandings and misunderstandings. We used the shared spreadsheet's comments as a place for starting discussions, which we often expanded on in our weekly meetings. During our weekly meetings, we often engaged in a storytelling activity where I recounted an event surrounding a specific data point. We then discussed the story and started to make links and connections with other points of data.

To further our analysis, I downloaded the audio files from a selection of the most revealing, intriguing and relevant utterances from the spreadsheet. To do so, I followed a process that required using the developer interface to download the .wav files from the Amazon Alexa website (NivarTech, 2019). Once downloaded, I clustered the audio files by theme and linked them on Google slides to share with the team. We used Google Slides because it is an easy, collaborative tool that allows for a form of sketching with sound—sound clips can easily be dragged and dropped onto the slides, could be annotated with text, and could be replayed by anyone in the team as they accessed the slides. We continued our process of commenting and annotation on the google slides, as a place to also reflect on tone, background noise, sonic context, and general atmosphere of the recordings.

Finally, following Ellis' call to action for mixed genres in autoethnography (such as novel

autoethnographic writing) and inspired by Biggs' 'making experiments' in autoethnography (H. R. Biggs et al., 2021), we developed creative audio compositions with the .wav files. We experimented with looping (full clips or sections), reversing (listening in reverse certain segments or clips), layering (different parts of a sample, or various clips), and juxtaposing (to compare clips). Making these audio compositions invited us to listen anew, to attune ourselves to the clips and noticing with more precision the voice, tone, intention, or background noises in the clips. The results were often defamiliarizing: the words were often harder to understand, again, inviting a different kind of listening. We each created a set of compositions that we shared at our weekly meeting, spending time listening together. We repeated this activity three times, each time adjusting our choice of initial clips and remix method. We discuss a few of our audio experiments in the findings below, especially in section 2.4.2.

2.3.4 Ethical Considerations

Throughout this study, I paid attention to consent, anonymity, and an ethic of care (Bennett et al., 2020; Key et al., 2021) as main guidelines for ethical considerations. Before starting the study, I talked with both Warlock and Michael to explain my goal of examining questions of voice assistants and queerness, and perhaps interrogate how IoT devices have baked in assumptions about the home, households, and relationships. Warlock and Michael had questions about the Echo Dot's functionality like 'is it always listening?'. I explained that the device would always be on, that it is listening for the wake word and that only the interactions with Alexa are recorded. I also showed them the mute button and said they could unplug the device. I also showed them the Alexa app, which offers a history of the recorded interactions via transcripts and audio files. They tested it to show how it worked. Throughout the study, if Warlock or Michael wanted to review an interaction with Alexa (for instance if something odd or funny had happened), they asked me and I showed them on the app—this was a necessary step because the Alexa account was just on my name, and while all three of us were living with the Echo Dot, only I had access to the app. Both Warlock and Michael understood that the recorded interactions would become part of a data set for

the study and consented to this use.

After my breakup with Michael, Michael unplugged the Echo Dot from his apartment and gave it back to me, as part of the 'breakup goodie bag'. After processing my breakup for some time, I didn't feel comfortable using the recorded Alexa from our shared lives. I chose not to use that data for the study, but I kept the other Echo Dot connected in my apartment with Warlock. Simultaneously, the focus of the research inquiry shifted to my breakup experience, and the role of Alexa during that time. When reporting on examples throughout this paper, I continue to use pseudonyms to protect Warlock and Michael's anonymity.

Finally, working through the data analysis meant I revisited some difficult moments from the past months—at times on my own and at times while recounting specific events to Rosner and Desjardins. As a team, we checked in about the intensity of this work and offered to slow down or pause if needed. The emotional intensity of this work strongly influenced how I would design and deploy a zine and design kit for other people to explore their personal data, as described in chapters 3 and 4. The risks of autospeculation are further unpacked in chapter 5. We also checked at various times about what parts of this project should be published and what should remain private. We acknowledged that this can change over time and that in the academic publication cycle there will be a few opportunities to revise the manuscript before it is published.

2.4 Findings

In this section, I offer two main themes for examining the intersections of voice assistant technology, queerness, relationships, breakup, and my lived experience. First, I discuss the various ways Alexa encountered queer break-up and how that intersected with my experience. Second, I unpack how I used sound to understand queer breakup, through a series of listening and remixing exercises.

2.4.1 How does Alexa experience queer break-up?

A few days after my breakup with Michael, I went back to living full-time in my apartment with Warlock. I had previously been splitting my time between living in my apartment with Warlock mostly during the week, and living with Michael mostly on weekends. While Warlock was excited to have me home again more, I was still going through a breakup, and I was seeking all of the support that I could possibly get. During the pandemic, this was especially difficult to do. In the throes of heartache, I remember thinking to myself:

> *"This is intense. How long is this going to last? I know that it will take time for me to move past this breakup... but I don't know how long. I wonder if Alexa knows? People go through breakups all the time. I can't possibly be the only person with this voice assistant going through a breakup. What if I asked Alexa for help?"*

So, I turned my head towards the Alexa device on my kitchen countertop and asked, somberly:

> Kinnee: *"Alexa, how long does heartache last?"*
>
> Alexa: *"'Heartache' by ONE OK ROCK is 4 minutes and 24 seconds."*

Alexa's response was unexpected to say the least. In that moment, I felt pretty disappointed—all I was looking for was some sort of estimate. At the same time, Alexa's answer reminded me that I was trying to rationalize a breakup with my question. Alexa's hyper-literal response intrigued me because it was, in a way, correct. At the same time, I did not receive the information that I was seeking, and I wasn't sure how else to ask Alexa for it. When conversations around sensitive topics like heartache are machine-interpreted so literally, it can hinder the intent of the original inquiry. At the same time, it can also reveal new meanings and interpretations of the questions that we ask the technologies in our homes. A

hyper-literal answer to a metaphorical question might alert us to underlying assumptions in our own inquiries.

As this vignette illustrates, when conversations lack context to inform meaning, they can lead to unexpected outcomes. Below, I discuss how glitches in our interactions with Alexa might reveal some of the assumptions for all conversants involved. I also discuss coterminous temporalities in relationship to my lived experience of my queer personhood.

Heartbreak Glitch

How does Alexa experience queer break-up? Alexa did not explicitly experience or recognize the breakup—it didn't codify or encode it—but began to engage with the breakup through system errors, or what Legacy Russel (Russell, 2020) might call the glitch—a "built-in technological anxiety of something gone wrong" (Russell, 2020, p. 7). Many glitches were discovered and encountered over the span of the study. Some were noticed and captured, while others weren't.

Before the breakup happened, one of the first glitches that I noticed was the (mis)recognizing of voices. Alexa would address me or one of my partners with the other's name. A few times, this led to some uncomfortable moments in which one partner was mis-recognized as another (ex. Alexa saying *"You're Warlock, right?"* to Michael). This made me wonder: What do glitches reveal? As I asked this question, I became more familiar with some of the common glitches that unfolded through our cohabitation. I made a list, inspired by Mimi Onuoha's Library of Missing Datasets (Onuoha, 2016), of the seven most common glitches that I lived with over the span of the study. When looking through the transcripts of my interactions, these phrases appeared instead of the expected transcription of my commands or questions to Alexa:

1. No records found

2. No text stored

3. “”

4. “i”

5. Audio could not be understood

6. Audio was not intended for Alexa

7. Not Applicable

When I looked at and listened to my personal data, this list became a way of noticing when things didn't go as planned in my interactions with Alexa. By examining these points of breakdown, or glitches, I found that some of the most interesting bits of data were hidden behind glitches. For instance, in attuning myself further to the recorded interactions, I learned what kinds of audio were intended for Alexa (6), I learned what kinds of audio could be understood (5), I learned what kinds of records could be retrieved (1), and I learned what kinds of text were stored. Designing with glitches sometimes means playing into their own binary logics to reveal the data that it belies. These technical glitches also include various forms of non-storage (1, 2), empty strings (3), and declarations of what audio is understandable (5) or “intended for” IT. Still other technical glitches, such as a transcription reading “Not Applicable,” provide very little information about what went wrong during the interaction.

In addition to the technical glitches, in which the technology was the source of generative glitching, there were also semantic glitches. Semantic glitches are glitches in which the meanings of an interaction are misread, misunderstood, or taken out of context by the human (myself), the voice assistant, or both of us. Semantic glitches arise when there is a misunderstanding in the meaning, tone, or intent of what is said. For example, Alexa sometimes misheard what I said. When asking a question, it might simply say “sorry, I don't understand,” but when asking Alexa to record a note, the implications are different

as the misunderstanding—the glitch—becomes part of the archive I create for myself using this tool. In one example, Alexa understood:

> *"it's hard to move off from bring up swim there are reminders everywhere"* [Alexa's transcription, what it heard]

While I had said:

> *"It's hard to move on from break-ups when there are reminders everywhere"* [sic, transl.]

When I asked Alexa to "remember" this observation, it transcribed what I said and appended it to a file called "Memories.csv," which is stored within a directory called "Alerts". In this directory, there are also .csv files for storing and maintaining lists of Alarms, Notifications, and Mobile Push Notifications. In this example, my queer use of Alexa allowed me to generate a record of my lived experience in that moment and involved the use of it as a memory device that can be embedded with reminders. However, here, the glitch renders invisible perhaps the most important word of the sentence—"break-ups"—opening questions about what is truly "remembered".

Some interactions with Alexa highlight the ways in which curations from recommender systems can create ableist and insensitive interactions that marginalize queer and disabled people in their own homes. For example, when I confided in Alexa during my breakup, I was disappointed to hear an apology from the voice assistant.

> Kinnee: *"Alexa my boyfriend just broke up with me"*
>
> Alexa: *"Sorry to hear that. Talking to a friend, listening to music, or taking a walk may help. I hope you feel better soon."*

Why was the voice assistant saying that it was sorry for me? Alexa didn't even know me or this person? However, in that moment, I was admittedly desperate. I decided, despite

feeling underwhelmed by Alexa's response, to take the advice. When I did this, I felt better. And so I felt troubled and uncertain about the helpfulness of the voice assistant in my home. Is normative advice better than no advice?

Other interactions, such as seen below, highlight how sensitive questions were mis-parsed by Alexa, sometimes providing comic relief during otherwise heavy or serious personal conversations.

> Kinnee: *"Alexa can you forget who Michelle*[4] *is"* [Alexa's transcription, what it heard]
>
> Alexa: *"Sorry, I don't know that one"*

In this case, while I was trying to remove Michael from my Alexa's notes and memories, Alexa's misunderstanding of Michael's name had the effect of re-gendering and/or feminizing Michael's name. As a glitch, this becomes an interesting observation—seemingly small errors can have a grand impact on people's sense of self or sense of others. However, when looking deeper, I noticed that I asked Alexa to forget who Michael is in hopes of erasing any memory of him from my Alexa devices. Alexa's response of *"Sorry, I don't know that one,"* seemed to signal to me that Alexa had already forgotten about Michael. It wasn't until afterwards, when I was reviewing the transcripts, that I realized what had happened: Alexa "thought" I was asking her to forget someone who wasn't in her memory to begin with.

At the same time, these semantically glitched interactions sometimes invalidated the perspective of the speaker—suggesting that Alexa wasn't listening, or listening closely, to what was being confided. These moments reveal that voice assistant technologies such as Alexa are not yet designed or optimized for sensitive conversations. Moreover, talking about, and processing over time, our design research team grasped something like a queer breakup as fundamentally multiple. Coupled with a voice assistant, it demands attention to the

[4]Michael and Michelle are pseudonyms in this paper. We use "Michelle" to represent how Alexa mis-parsed Michael's name.

nuances of people's lifestyles, relationship formations, and values. A breakup might be a welcome reprieve or it might be devastating at first, and later become a generative, positive life event. Designing with queerness in mind means making no assumptions and erring on the side of curiosity (e.g. like Eddi in Rogers et al., 2019).

For instance, why didn't Alexa ask me any questions before apologizing to me for my own decision to disclose? Why do all three recommendations make assumptions about my ability (that I can hear, that I can walk, that I can talk?), and why do none of them involve having a fuller conversation with Alexa? What kinds of conversations should we have with voice assistants, and what kinds of conversations should we not have? How might conversations with voice assistants about/around queer breakup illuminate the baked-in values and assumptions of an interactive system?

While Alexa's recommendations for my queer heartbreak were normative, they still helped me. This complicated my understanding of bias in AI/ML systems: What if a bias that is designed to help an imagined, more normative person ends up also being helpful to an unimagined, queer person? Does this mean that the design was queer, or "queer enough" all along? At what point does a generalized recommendation become heteronormative recommendation? How might we queer interaction design without targeting, profiling, silencing, invisibilizing, or excluding people in the process?

Lastly, my conversations with Alexa often involved the use of humor to avoid grappling with the politics of the glitch/bias that it enacted. Sometimes, the sense of humor arose from awkward pauses or unexpected responses (both good and bad). On one hand, some pre-scripted responses from the voice assistant (ex. Asking Alexa "what are your pronouns?" and hearing "As an AI, I don't have a gender" in response) are an artifact of developers' decisions to opt out of charged conversations with a blanket statement. Meanwhile, other responses such as "I don't know that" may come across as thoughtful or even profound declarations. Designing interactive systems that can externalize what they don't know might allow for greater rapport between people and machines—by furthering our understandings of what's human, of what's machine, of what can happen at the human-machine nexus, and

of what's happening during our interactions. Humor is a release from the tensions in my personal data. These tensions were often between what was and what is, or between what was and what could-have-been. Breakups are riddled with expectations versus realities. Queer breakups are riddled with queer expectations versus queer realities and queer expectations versus normative realities. I used humor as a way of asking uncomfortable questions and as a way of explicating uncomfortable, paratextual anec-data (anecdotal data).

Coterminous Temporalities

In this study, while glitches were one way I observed Alexa experiencing my queer breakup, I also noticed that I formed associations over time with the content, temporality, and context of Alexa use. Content, temporality, and context collapsed into interactions with Alexa, forming another way the device became part of a breakup.

When I plugged my Alexa device back in at the end of summer, after having taken a pause post-breakup, I was not expecting to receive a reminder of my recent breakup. Around this time, I had recently stopped taking a medication (PrEP, or, Pre-Exposure Prophylaxis) that I had been taking during my relationship with Michael—and for a few months afterwards. To me, stopping this medication was another layer of my breakup with Michael—a part of the long tail of the breakup. That night, at 9pm, my Alexa device began sounding an alarm and blinking orange lights.

". . . "take my PrEP" . . . "take my PrEP" . . . "take my PrEP" . . . "

I had programmed the Alexa device to announce this reminder in my home every night at 9pm. However, at this time, I had not been taking PrEP for at least a few months. Alexa was reminding me to take a medication that I had stopped taking after the breakup. I speculated about how this situation (i.e. getting an outdated reminder for a former medication) could have been dangerous. This out-of-sync reminder from Alexa could have instructed someone to unknowingly and accidentally mistreat themselves. Furthermore, the reminder could have disclosed my personal, sensitive medical information to the entire captive audience of

my home—including my partner or any potential visitors. Regarding PrEP specifically, this out-of-sync reminder could have revealed or suggested a number of things that are often kept private: sexual activity, substance use, and more. This situation reflects the broad stigma surrounding PrEP's uses and highlights the instrumentation of voice assistant technologies as devices of inquiry for probing the particulars of queer lives.

Moreover, I realized how this particular reminder's blurring of the private and the public within the home could have caused unwanted conversations for some. I considered how myself, Michael, and Warlock were all aware that I was taking PrEP. However, if this hadn't been the case, the reminder could have instantiated many unwanted consequences.

I also noticed the many different kinds of information that were encoded in this brief reminder: part my daily routine, part of my medical regimen, which medications I had access to, and multiple personal identifiers surrounding sexuality and sexual activity. I also thought about PrEP's other use as a protective agent for intravenous drug users. I thought about how PrEP is used by some of the most vulnerable people in the queer community, and how my use of Alexa to offload the labor of remembering to take my PrEP felt subversive. I was also reminded of how PrEP can be taken or not taken at different times in my life, daily or as needed, and how I appreciated having this tool as a protector.

With multitudes of possibilities at multiple intersections of queerness, sex, sexuality, and more encoded in this interaction, I considered how this reminder revealed both a lot of information and very little information at the same time. I decided to leave the reminder as it was to see what might happen if I had this reminder to reflect on every night.

When this reminder first sounded after I had replugged the Alexa device, I was immediately reminded of my breakup—and all of the associations with that time, that person, those places, those things, those sounds, those smells, those sights, and those feelings. I recalled that it was...

> *"Interesting to see how over time I would feel fewer reminders about Michael and more of a sense of curiosity to ask: what would it mean if I had a reminder about*

this other moment in my life?"

Over time, the ghost reminders became less about my time with Michael and instead became more about noticing however I was experiencing queer breakup at the instance of the reminder. The reminder's use became increasingly about reflection—drawing connections between the person I was when I first set up the reminder, and the person that I was as I heard it each day. The ghost reminders invited an unbounded speculation of what could have been and of what was. They are artifacts of a zeitgeist that, via the Alexa devices, carried over from before and after my queer breakup. The ghost reminders highlight how Alexa devices, and similar domestic technologies, are optimized to provide timely reminders, but that the designed systems underlying these reminders are perhaps not yet sensitive to degrees of change that accompany relationship dissolution. The infrastructural work necessary for supporting people whose living and life situations change suddenly and unexpectedly is immense. Part of this work might include designing ways of forgetting, or assessing the usefulness of interactions through dynamic frameworks that can account for dual, multiple, and queer use.

My experience living and talking with Alexa as a memory device inspired many questions about the relationship between technology and memory. I contemplated what kinds of memories I'd want to store within this sonic recordkeeping device—keeping in mind that I could revisit the audio recording of myself saying it later for more context. This also meant considering what kinds of things I would not wish to remember as well; inviting a more queer modality of memory-making, if one chose to use Alexa as such. I explored queer, conventional, and empirical memory uses of Alexa's "memories" and reminders. While discussing with Rosner and Desjardins, I recalled:

> *"So, each time I was reminded, I didn't have control over which ones I was reminded about on any given day; but the same thing being said would feel differently"*

While at first it seemed like I was only being reminded of one thing, I discovered that a

single reminder actually reminded me of infinitely many things—and that I wasn't fully in control of which memories would be summoned each time Alexa reminded me to "take my PrEP". Over time, these interactions start to manifest multiple meanings and associations and became a reminder about other qualities and experiences in my life. These associations built on top of each other to form resonances and meanings that were never intended or imagined by their initial design(ers). When I was reminded to *"Take my PrEP"*, I was reminded of things like the stigma and fear surrounding HIV/AIDS that queer people live through every day. I was reminded of the asynchronous synchronicity of the language of "being positive" between the HIV/AIDS pandemic and the COVID-19 pandemic. I was reminded of the fear that I've lived with regarding HIV/AIDS, of the shift in my perceptions of safety with a pre-exposure prophylactic technology in hand, and of the work that remains to be done to destigmatize HIV/AIDS within and beyond queer communities.

Each time I heard this reminder in my home, my associations changed. However, each time, these associations were also strengthened. Sometimes, the reminder synced all the aforementioned associations with that moment that it was uttered—a kind of updating to morph into the current context. At the same time, over time, the reminder became less jarring and intrusive, less strange, less novel, and became more a part of the everyday soundscapes of my queer home.

In addition to using Alexa for scheduled reminders, as described above, I also used Alexa for its 'remember' function. If one asks Alexa to "Remember BLANK," then it will record that voice entry and store it within a file called "Memories.csv". This creates a list of things that Alexa will "remember" for you. For example, early on in my relationship with Michael, I asked Alexa to "Remember that Michael is my friend". Then, when we became boyfriends, I asked Alexa to "Remember that Michael is my boyfriend". In response, Alexa said: "Sure, I'll remember that 'Michael is my boyfriend'," which struck me as odd. After this interaction, if I were to ask Alexa to "tell me something about Michael" or ask "what do you remember about Michael?," then it would say "Brian, this is what I found: From your notes: Michael is my boyfriend."

In the internal logics of my Alexa device, it wasn't until after the breakup, when I updated Alexa's memory of Michael, that Michael wasn't my boyfriend anymore. The transcripts read as follows:

- "Michael is my boyfriend"
- April 17th, 2021, 6:18pm
- 2021-04-17T18:18:56.567Z
- "Michael is my friend"
- May 6th, 2021, 6:33pm
- 2021-05-06T18:33:14.013Z

While this interaction may not have been designed with my particular use case in mind, I found this experience to be an interesting way of shifting my own perception of my relationship with/to Michael. It also offloaded some of the weight of the breakup—the Alexa device was a vessel for making sense of my queer breakup. Queering the Alexa device and enrolling it into a queer breakup fostered a subversive exploration of normative domestic tools for queer domestic use. The Alexa device was programmed according to the progression of my queer breakup on my own terms. This form of control over what my household devices do or don't "remember" meant maintaining an ongoing dialogue with my devices about the people in my life, the kinds of relationships that I have/had with them, and an ongoing archive of my voice commanding Alexa to remember. In asking Alexa to remember relationship statuses across the queer breakup, I enrolled the digital assistant in my relationship sensemaking to record brief notes about the particulars of my relationship status with Michael—from friend, to boyfriend, to friend, to past lover.

Here, I used the Alexa devices as a data collection instrument for capturing information about relationships that was often squishy, difficult to pin down, or couldn't be located

in a particular moment. I wanted to see if logging details on the Alexa devices about my relationships would change what I externalized about the relationships. In the case of Michael and I, the exercise of asking Alexa to remember one another as something (i.e. a friend, a boyfriend, a partner, etc.) surfaced conversations around the labels that I used for/with my intimate and romantic partners. When I asked Alexa to remember that "Michael is my boyfriend", I was logging a moment in our relationship when that term felt like it fit for both of us. By logging this, I did not specify my relationship to Michael, but rather, I logged Michael's relationship to me at that moment. I then updated this accordingly to "Michael is my friend" when we broke up. Here, Alexa's memory capacities were explored for their potential to remember particulars of my most intimate relationships. Since the question of "what are we?", or, of "defining the relationship" is a question that we all face in our relationships, how might our digital assistants help us in these sometimes-awkward situations, when vulnerability is high and relationships are undergoing definitional work between partners?

2.4.2 How do we use sound to understand queer breakup?

In the next phase of our study, we explored the use of sound as data to better understand queer breakup. As previously mentioned, I lived with two different partners and two different Alexa devices in two homes. But this experience also involved two different soundscapes[5]. Drawing from this experience, we explore the potential for treating sonic technologies and sounds as rich data for design inquiry. In order to enrich our autoethnographic approach, we listened individually and collectively (as a team of three) to recordings from my interactions with Alexa from the time of the breakup. During this investigation, we selected audio bytes based on our collective data analysis with the transcript. I flagged recordings that stood

[5]Here, we use the term "soundscape" as coined by Michael Southworth and later popularized by R. Murray Schafer (Pinch & Bijsterveld, 2004; Schafer, 1993) to describe acoustic environments in terms of how they are perceived and experienced by humans and machines. Projects such as Schafer's World Soundscapes Project (WSP) and The Soundscape of Modernity by Emily Thompson (Thompson, 2004) have provided strong foundations for soundscape studies, or acoustic ecologies, of spaces and places.

out as important for understanding queer breakup and queer space through digital sound. These recordings were then shared with the other two members of the research team. In this process, Alexa's biases for what kinds of audio were deemed recordable continued to unfold. At the same time, our design research team also reflected on our own biases when investigating personal audio data that has been collected by a commercial voice assistant. For instance, we questioned biases of what we expected to have been captured versus what actually was captured. Our data analysis demonstrates that a multi-media approach to studying interactions with voice assistants—first through direct interaction with voice, then with the machine-generated transcript, and then with the audio—can reveal important context and provide additional information that bring us closer to a glimpse at the lived experience itself.

Attuning to sound

Going into our experiments with audio, we wanted to know: "How do we learn to 'listen' or attend or attune closely to the data?". Our experiments with audio built on our autoethnographic approach by using audio clips from the voice assistant device in Warlock's and my apartment and from the voice assistant device in Michael's apartment. These devices archive interactions by recording the person speaking and generating a machine transcription of what is said by both the device/virtual assistant (Alexa) and what is said by the person using it (myself, Warlock, or Michael). We manipulated these audio clips as part of our design inquiry. In doing so, our analysis shifted away from listening and attuning to the sounds of queer home, and shifted towards attuning through audio experiments and remixes. Working with audio clips that are often less than ten seconds long, we decided to experiment with playing the audio on "loop" (repeating over and over again). When we did this, we noticed changes in our experience of the audio—such as the foreground of the audio gradually becoming less noticeable, the background noises becoming more noticeable. This encouraged us to listen for sounds that were not described in the transcript and to listen for sounds that were not transcribable. We considered how the Alexa devices capture audio when the wake word is spoken, and yet there is no control over what background noises may

be present in the recording (H. Tan et al., 2022; Parviainen & Søndergaard, 2020). Often, we could hear sounds of the home such as a dishwasher, a noisy television, or a tea kettle.

As we continued our investigations, we found that the background noises often contained glimpses into their domestic environments. This included sounds of other people who were present in the home during the interactions with Alexa—talking at the same time as Alexa (intentionally or unintentionally). While these sounds were recorded by the Echo devices, they were also simultaneously backgrounded and invisibilized by the machine-generated transcript. Our findings suggest that in the case of the Alexa voice assistant and the Echo smart home speakers, machine listening means listening to one person at a time—but still capturing all of the surrounding soundscapes. The design of these devices, as an "always-on" technology with multiple microphones and features such as far-field listening, prioritizes the capturing of audio from domestic environments. To some, these technologies are a source of fear, distrust, and intrusion. To others, these technologies have become normalized and are regarded as mundane—to the point that many people forget they have them (turned on) in their homes.

The home contains coinciding soundscapes of people's everyday lived experience. How might we use these sounds that are otherwise unprioritized, yet still inform lived experiences of home? What if, rather than prioritizing the machine log's data from the interaction, we instead explored the use of audio "scraps" to inform our understanding of how people use domestic devices and spaces? How might we understand these technological systems in terms of the relationship between intimacy and security? And how might first-person accounts of living with technologies use sonic data and sonic perspectives to further contextualize and center lived experiences in the design of interactive systems?

Furthermore, we discovered that some background noises, such as a news report on the television, could contain details about where we were and when. In our study, I asked Alexa: "alexa what is a breakup". Alexa read back the Wikipedia entry for "break-up". In the .wav file of this interaction, a newscaster is speaking about something *"...south of Seattle"*. When a member of the design research team noticed this background sound, they asked me

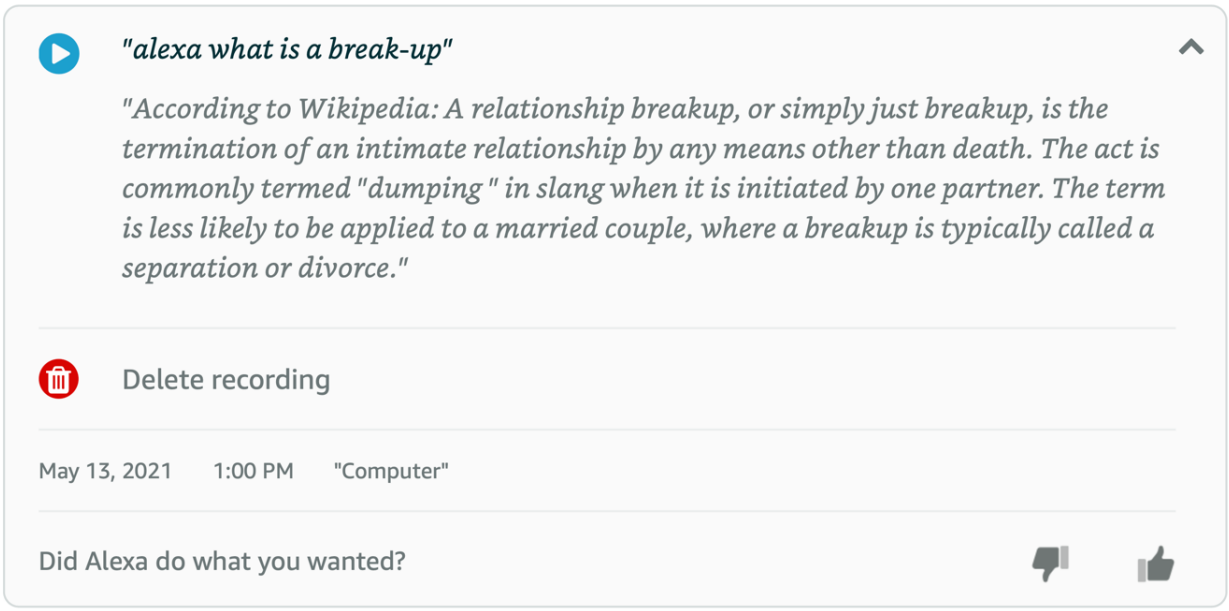


Figure 2.1: An entry in the "Review Voice History" section of the "Privacy Settings" interface for the Amazon Alexa account and devices. The white arrow within a blue circle plays a recording from the conversation when clicked. A transcription of the speech from the interaction displays the text of the person talking in a black text, and the text from the Alexa device's speech in a lighter gray text. The trash can icon within a red circle, labeled "Delete recording", deletes the recording when clicked. Below, additional metadata from the interaction is listed, including the date, time, and device name. In this case, the Alexa device has been named "Computer".

if I remembered what was playing in the background. I remembered that I was listening to a local news story about a local LGBTQ+ bar that had recently burned down—with suspicions of arson. I recounted how the moment of this recording was intensely defined by multitudes of mourning: my own queer breakup and the loss of space for the local LGBTQ+ community. Perhaps counterintuitively, I then used this sound byte along with others—cutting, looping, splicing, and remixing—as a material for designing something from the sounds of queer heartbreak.

I found that using these sound bytes felt perhaps a bit morbid at first. It was difficult for me to hear myself at a moment when I was so unhappy and confused–and to hear myself saying such blunt confessions aloud. However, as more snippets of audio were included in the composition, and as the sounds became new sounds in combination, the pain I had heard in my voice began to sound harmonic, song-like, and rhythmic. By recombining and manipulating the audio, I discovered that I could alter my relationship to the audio and all of its associations. When the sounds of queer heartbreak were distilled in terms of their background noises, sonic textures previously unheard or unhear-able became foregrounded. How might this creative process of listening, noticing, and using soundscapes from digital, domestic technologies allow us to texture our lived experiences of spaces? Can we use sound from a queer time and place to reimagine our understandings of what happened to us, around us, and through us?

Differentiating between voices

In a third set of experiments, our team explored the potential for Alexa to differentiate between voices. We wondered what conditions might allow Alexa to reliably differentiate between voices; and, conversely, what conditions might curtail or change that differentiation. We also wondered whether Alexa might recognize its own voice. Searching through our archive of recordings, we noticed several examples of recordings made by Alexa of Alexa—typically the last few words from its previous turn in conversation, or the beginning of a new utterance that was quickly cut off in the recording. Other clips recorded me

without me intending to speak to Alexa. In our sonic experimentation, we began with a clip of me stating "Alexa, my boyfriend broke up with me" and combined it with a clip of a recording made in error, when Alexa recorded me saying "Yes!" enthusiastically and without me meaning for Alexa to hear. Listening to the clips in sequence, we noticed a distinct difference in pitch, shifting from the low rumble of the directive to the high timbre of the erroneous recording. We then stretched out the clips, using speed to explore how slowing down the sound might reveal a different rhythm or tonal quality. Instead, we noticed the recognizability of the voice despite the changes. Trying to further obscure this recognition, we reversed the audio clips. Despite no longer understanding the audio, we found my voice recognizable.

One of the questions emerging from our experimentation with speed and direction involved this discernibility of reverse listening. In particular, we asked: If identity is discernible for humans from audio played in reverse, how does this discernability create friction when going through Alexa's machine listening processes? During our experiments, we catalogued some of the sorts of questions and answers that Alexa provides. We understood these technologies to contain Machine Learning (ML), Natural Language Processing (NLP), and Artificial Intelligence (AI) technologies. Our investigation probed these technologies for various bits of information that might tell us more about how they work—what sorts of algorithmic biases were present, what the limitations of the hardware and software might be, and what kinds of sources Alexa might be retrieving data from.

Thinking of Alexa and the Echo Dot devices as Natural Language Processing (NLP) technologies, we considered how Alexa was processing information from user-input voice commands and various knowledge bases (Alexa answers, Wikipedia, etc.). NLP is a term that is used to describe both Natural Language Generating (NLG) and Natural Language Understanding (NLU). Our experiment highlighted moments when both the NLU (algorithms for Alexa's "understanding" of speech) and the NLG, (algorithms for Alexa's "generating" of speech), and subsequently the NLP provided unexpected or unwanted interactions. When researching such technologies, it remains difficult to discern precisely which algorithms, sources,

and sequences are at play and when.

While we might not know or have access to exactly what is happening at a more granular level within the internal logics and algorithms of the voice assistant devices, we do have a sense of what kinds of algorithmic processes are underway in different phases of voice interactions. First, a wake word algorithm (NLU) recognizes an utterance of the wake word, or a short phrase or name within an ongoing stream of sound. This signifies the beginning of a voice query. For the Alexa devices, the wake word is "Alexa" by default, but it can also be changed to "Computer" or "Echo". The recorded speech is processed and transcribed by another set of algorithms (NLP) that determine which words and produce a textual transcript from the interaction. Then, a third set of algorithms (NLG) generate a spoken response from the voice assistant device that is also, itself, transcribed. The result is a series of dialogues between people and machines in their homes.

Recalling the PrEP reminder vignette from above, our sonic experimentation with reverse human listening in contrast with machine listening further opened questions of privacy, intimacy, and power. During the NLG process, Alexa's language (and voice) is generated from a transcript (here "take my PrEP"). While these personal, potentially-private reminders from Alexa were intended as a means of medication management for myself, they were still announced from a speaker in their small studio apartment. Private reminders became public in their home, through the NLG process. This meant that people in both households would hear the same reminders every day—even if the reminder wasn't intended for them. Moreover, because I was the Amazon account owner, I was the only person who had access to the Alexa devices, settings, notifications, and data via the Alexa mobile app—moving beyond the voice-only interaction modality of the smart speaker. This ownership put me in a position of uneven power and control over the sounds of their shared homes. Sometimes this position meant that information (notifications) was only relayed to me, and not to anyone else that I lived with. While neither of my partners could control the devices via the mobile app, they could still use voice commands to make some changes. Sometimes, however, Alexa would instruct my partner(s) to access information from their interaction with Alexa via the

mobile app—the mobile app that neither Warlock nor Michael had access to! Again, this prompt put me in a position of gatekeeper to Alexa notifications—a role that I did not ask to play and did not wish to perform. However, there was not an alternative for all three of us to share account(s). Without a shared account, there was no shared accountability: Alexa was fully "my" device, whether I wanted it to be or not.

This set of experiments investigated how Alexa discerns between voices, how multiple layers of NLP technologies underly Alexa's functionality, and considered how ownership can create an uneven landscape of power, risks, and vulnerabilities. Moreover, matters of ownership, shared accounts, and accountability further texture these domestic power dynamics by limiting access to the sonic record of an entire household to one person.

What is lost/gained in the translation to transcript?

In a final set of experiments, we noticed how close listening exposed what Alexa simultaneously overlooked and captured. As Alexa transcribes speech to text, the signifiers of voice, tone, and context are flattened—an experience you, as a reader, are likely feeling now. In our data analysis process, we began by exploring the textual transcripts of the interactions with Alexa. As we did this, we highlighted, tagged, and discussed the voice interactions that had been machine-translated to text. Sometimes, we couldn't discern what was being said with just the text alone. Other times, we felt that we could understand what was happening during that interaction based on just the text alone.

As we moved further into analysis, we added in audio from the interactions that we had spent the most time analyzing, or that we were otherwise curious to learn more about. In doing so, we noticed that there was much more information contained within the audio clips than the text. We uncovered audio from interactions where no speech was transcribed, but a recording was still captured nonetheless. Recalling the clip when I heard the faint rumble of a news report in background, the research team noticed a certain way of concern in the my voice that we hadn't heard before, a context around queerness that the Alexa missed but still managed to hold on to. In noises like this, we noticed that things such as tone,

sarcasm, and emotion that cannot be described by a literal, direct translation/transcription of speech to text. This engagement meant that sometimes the transcribed text alone was misleading—telling us a different story from what we had understood it to be when we had encountered it as text. We considered what it meant that the device we had used to collect data during the study accurately transcribed some words, but not others. We also distinguished further between the Alexa devices as sonic data collectors, producing recordings from the interactions, and as machine transcribers, producing transcripts from the interactions. Our analysis of both text and audio data from the Alexa devices suggested that listening to the audio data from interactions with Alexa provided a more intimate portrait of the everyday soundscapes within the interactions.

2.5 Discussion

I have so far explored the range of subtle but notable ways my queer heartbreak brings new readings of smartness at home. Using the Alexa voice assistant service across two devices, two homes, and two queer relationships exposes some of the taken-for-granted assumptions built into a smart device. Our analysis and audio experiments help design researchers conceptualize what it means for a voice to be recognizable, for a reminder to permeate distinct spaces and times, and for a device that reinforces heteronormative assumptions to create conditions for imagining a relationship otherwise. My domestic life exposes challenges to interpretation, gaps in translation, but also the somatic and often surprising pleasures that come from being with an imperfect NLP service.

Below I reflect on these tensions between queerness and design, encoded harm, and encoded possibility, and use our collaborative analysis to explore what potentials this study holds for theorizing queer experience with and through interaction design.

2.5.1 Queering Sonic Technologies

As a first set of concerns, this study foregrounds some of the risks of applying a fixed concept of sexuality or gender to the voice assistant design. Through design inquiry, I noticed

that a great risk of sonic technologies in the home is, of course, misuse. Voice assistants are often always plugged in, always on, always "listening," and can be remotely accessed. Moreover, these technologies continue to be developed for greater accuracy at detecting and differentiating between voices. In this study, I noticed that the Alexa device in my home had trouble differentiating between my own voice and the voices of both of my partners (ex. Alexa saying "You're Warlock, right?" when speaking to Michael)—often mixing them up and mistaking them for one another. I had a few speculations as to why this might be happening: maybe their voices are too similar, maybe something about their cadence or intonation was too similar, or maybe the voice-recognition algorithm just didn't have enough data yet to make the proper choice? Beyond these possibilities, however, the misreadings prompted me to notice the ease of reinforcing heteronormative patterns. I considered that the difference between my own voice and my partners' voices was likely less pronounced than, say, between a normative male-female couple. This made me wonder: was Alexa predisposed to assume romantic partnerships with two adults, as opposed to other forms of co-habitation (roommates, co-operative housing, platonic partners, etc.)?

The problem of inclusion in technology design is, to borrow language from HCI scholar Cynthia Bennett, "slippery" at best (Bennett et al., 2021). On one hand, training Alexa on queer voices from the queer bodies of queer people might, indeed, result in a voice-recognition algorithm that can more adequately distinguish between queer voices. However, do we really want corporations like Amazon to be extracting information from Queer bodies in such a targeted manner—in their own homes no less? Do any queer people actually want this? Are any queer people actually asking for this? Echoing HCI scholars reflections on facial recognition (Bennett et al., 2021; Scheuerman et al., 2019), this study suggests such aspirations may unwittingly reinforce another vein of techno-solutionism. Being included by Alexa may not be, in fact, the preferred future.

With the risks of inclusion in mind, the question then becomes: how might designers queer interaction design without targeting, profiling, silencing, erasing, or excluding people in the process? By investing in categories of social difference, designers simultaneously count

some people and label them as "queer," while deciding that still others remain "not queer enough". This approach to queerness precludes the possibilities of people becoming more or less queer across their lifetimes, foregoes all of the context to people's identifiers, and ossifies the individual under a convenient term in an attempt to understand something that is difficult to understand by definition. How our field accomplishes this work without mobilizing the potentially-dangerous language of tokenized inclusion that places people in boxes and renders anyone the least bit divergent as an "other" remains difficult to imagine (Hoffmann, 2021). It suggests, in line with recent speculative resistance through design (Ming et al., 2020), that we, as design researchers, liberate our sonic sensitivities for understanding queerness in interaction design, in HCI, and beyond. Following Jordan Wirfs-Brock and colleagues' work with Spotify (Wirfs-Brock et al., 2020), this work suggests that voice assistants could use data to encourage reflection on listening practices with something like tone—for example, a device asking, "I can't quite tell what you mean: did you mean that literally or figuratively?". Moving beyond predictions and recommendations, devices might support new listening and reflection routines devices that users build into their daily engagements with sonic technologies (Desjardins & Tihanyi, 2019). But this work might also suggest bringing a more complex reading of sonic data to the regulatory bodies overseeing what data the voice assistant technologies collect and why.

2.5.2 Towards "Queer Enough" Interaction Design

A corollary to examining the encoding queer experience in sonic devices involves questioning the role of queerness in the wider process of interaction design. This work involves understanding how queerness becomes something to be designed. If we take seriously the idea that queerness exists on a spectrum, then this means that we are all affected—in varying shades and degrees—by designs of voice assistants that lack awareness or knowledge of queer ways of living. On the one hand, my study exposes the decision to design voice assistants that are completely unaware of queerness or queer ways of living as queer-phobic. As we saw across multiple engagements, one of the problems with the current state of voice assistant

technologies is that they often provide recommendations based on generalizations. But the point when a generalized recommendation becomes a heteronormative recommendation can be hard to pin down. By providing a broad blanket statement that could potentially apply to many people, the recommender algorithms are hedging bets, using a series of concurrent probability calculations, to determine how likely it is or isn't that a certain phrase or utterance will be appropriate based on the person's speech input. The problem with this process, however, is that it, again, assumes that most people are like most other people. As a result, it is statistically probable that most Alexa responses signal heteronormativity. It is important to remember that some generalizations still can apply to queer people. What's more, hyper-personalization might compel non-normative users to share private information without consent. However, when a generalization takes into account a series of assumptions about how "most" people live, it can very quickly shift from simply generalized advice to generalized and heteronormative advice. When we stop to consider the kinds of speech and text that Alexa and other digital assistants are trained on, how could we expect anything different? This research seeks not only to question the apparent heteronormativity of these devices, but rather to experiment with it as unexpected, queer users to further understand how queer personhood is and is not designed for in technological systems of dialogical technologies.

On the other hand, my study has explored the potential limits of smart liberatory design. Like myself, many queer people are likely well-aware of the harmful assumptions built into these systems, the ways in which our queer voices are or aren't listened to, and the aspects of our lifestyle that won't and can't be taken into account by Alexa because we live through and against these assumptions every day (Gomez-upegui, 2021). Since the logics of voice assistant technologies remain steeped in binaries, perhaps another approach is necessary.

What if, instead of categorizing interactions as "heteronormative" or "homonormative," design researchers use other, more precise language to get at the particulars of queerness and to celebrate its multiplicity? For instance, many interactions from our study were rendered through the lens of polyamory to account for that particular form of my queerness. Moreover,

I could have also explored their interactions through my identity as a young non-binary person or as someone living with multiple disabilities. As other HCI scholars have shown (Wirfs-Brock, 2021), voice assistants could be designed to give people opportunities to label their own experiences with their own language—to build a shared vocabulary along with the human and voice assistant. Until designers and researchers find tactful and dialogical ways of building and accounting for these varying shades and forms of queerness across people's lifetimes, the problem of mistrust with domestic voice technologies may only persist or grow more volatile. By amplifying our attention to nuance and sharing more stories of how these technologies intersect with queer lives through first-person use, our field might get closer to rich descriptions of exactly how these technologies work (or fail to work) at the registers of micro-aggression and fundamental misunderstandings.

2.5.3 Queer Use and Domestic Technology

Alongside understanding the encoding of queerness in design features and approaches, my work points to the particular potentials that come from queering engagements with smart devices. Historically, queer people have been barred from participation in cultures of domesticity (McDowell, 2019; Vider, 2020, 2022) as non-normative people and non-normative families living non-normative lives. In the context of North America, the Cold War-era fable of the white picket fence, neatly trimmed lawn, and a traditional nuclear family once rose to a level of prevalence that we might now consider to be a monoculture. Around the world, local cultures provide nuanced and encoded scripts that suggest a certain way or ways of living.

Today, while this image remains prevalent, our conversations about personhood, home, and family are evolving to consider a broader range of the social, cultural, and socioeconomic factors that influence where one lives, in what kinds of dwelling(s) one lives, how one lives, and with whom one lives. Queerness and queer culture remain sensitive topics that elude study by definition. The encroachment of voice assistants on queer spaces means a compromise of this secrecy, and perhaps subsequently, a compromise on the ways in which queerness is

allowed to manifest itself within interactive domestic sociotechnical systems.

A voice assistant might not be queer, but what comes from a queer person using the technology? Sarah Ahmed reminds us that queer use might grow from using a technology in ways or to ends that it was never designed or imagined to be used (Ahmed, 2019). In my study, the queer use of the Alexa devices in two queer homes and within two queer relationships provided a series of redundancies and samenesses throughout the system. We saw how the subversive nature of queer use created a strong platform for experimenting with our experiences using sonic technologies. Using the Alexa device in an environment that it wasn't designed for and in relationships that it wasn't designed for allowed us to unearth built-in assumptions in the system that might otherwise remain invisible. How could we design culturally-informed voice assistants when there is no *one* culture? How could we design queerness-informed voice assistants when there is no *one* way to be queer? The heterogeneity of queerness is often lost or misunderstood, and despite the declaration of the LGBTQIA2S+ acronym, designing technologies that paint across all experiences with a broad brush occludes the possibility that there is variation within and between the people whose queerness is tied to their sexuality and/or gender identity. Queerness can refer to the sameness across these experiences, and "queer" itself is an identifier that is a queer use; an appropriation and reclaiming of what was and sometimes still is a queer-phobic slur. Being "queer" signals an identification, solidarity, and realization that there are many other people in this world who don't neatly fit into the dominant culture around them. Centering queerness and queer culture is fraught when it always is, always was, and always will be at the margins.

2.5.4 Bias in Assistance

In a final set of concerns, this chapter exposes some of the tensions around exposing bias around queerness, but also using that bias toward new and unexpected ends. Across our engagements, we noticed that Alexa's advice mobilized assumptions about my body and ability, social networks, and hearing ability during the time of my queer breakup—a time

when culturally-informed, particular forms of care are of heightened importance and sensitivity. The harmful assumptions baked into digital assistants, voice assistants, and recommender systems, and other technologies of capture such as camera and film have been well-documented (Benjamin, 2019; Lau et al., 2018; Lee et al., 2021; Phan, 2019). Routinely, these biases function under a set of assumptions about a "normative" user. But what if a bias that is designed to help an imagined, more normative person ends up also being helpful to an unimagined, queer person? Does this mean that the design was already queer, or "queer enough" all along?

In the case of my queer breakup, the bias was audible when I was instructed by Alexa to "go for a walk, talk to a friend, or listen to music". Despite feeling like the advice from Alexa wasn't really "for me" during my queer breakup, my choice to suspend judgment and follow this advice led to some relief from my heartache. This complicated my idea of bias; I considered how an encoded misunderstanding or erasure might sometimes help the people who are most often excluded, invisibilized, or dehumanized by digital assistants. The queer use of advice from voice assistants like Alexa might mean following the script that is given, and then seeing how, when, or if it holds up to the particulars of a queer person's lived experience. The moments of breakdown—when the advice is no longer relevant to the queer person or people involved—further confirm that these systems invisibilize queer lives in nontrivial and non-deterministic ways. A device's misreading of queer lives will never fully determine queer experience.

2.6 Conclusion

In this chapter, I presented a combined autoethnographic and design inquiry into domestic sonic technologies and queer experience. By following my experiences across two homes, two Alexa devices, and two queer relationships, I explored the contours of encoding queerness (and/or queer phobia) in voice assistant devices, design approaches, and designed interactions. Across nine months of use and after processing three weeks of sonic breakup data from Amazon's Alexa, I learned that glitches and voice assistant prescripts are interwoven with

the soundscapes of everyday life, and that Alexa's recordings can challenge a sense of non-normative time through reminders and memories. My sonic experimentation led to further insights about the richness of the voice assistant recordings, how Alexa's system differentiates across voices, and how its processes of translation and transcription reveal opportunities for countering queer erasure. I end with potential strategies for design researchers to bring more nuance and complexity to the limitations wrought by binary and queerphobic logics, bringing new attention to the forms of queer resistance inherent in everyday lived experience with smartness at home.

In many ways, this first study attuned me to conduct later research studies with an ethics of care and a heightened awareness of the risks that are present when working intimately with personal data. For instance, I knew from firsthand experience how difficult it could be to talk with other people about my own personal data, and how vulnerability and trust figure into those research interactions. In the following chapters, I draw on my experience conducting this study to inform the design of a zine and design kit for reflecting and speculating in terms of one's own personal data and polyamory. Building on the knowledge that I gained from my sonic technology study, in Chapter 3, I co-designed an experience with polyamorous for other polyamorous people to better understand their relationships and lived experiences through zine-based, material reflection and speculation with their personal data. Chapter 4 describes the deployment of this zine and design kit, called the *Polymap Zine Kit*, wherein participants used pipe cleaners to represent their polyamorous relationships in the past, present, and future. Finally, this chapter was the beginning of my research on *autospeculation*, where speculation about what could have, should have, or might have been different spurred a unique form of reflective and speculative design. The methodological contribution of *autospeculation*, serves as a key methodological and analytical framework throughout the remaining chapters, and it is more fully developed in the final chapter, Chapter 5.

Chapter 3

THE POLYMAP ZINE AND KIT DESIGN

In this chapter, I will retrace the development of a zine, a design kit, and a design research interviewing process through the facilitation of a directed research group (DRG) (Turns & Ramey, 2006). First, I will unpack the *Designing with Polyamory* DRG in terms of the conversations that informed the design of the zine. Secondly, I will perform a close reading of the *Polymap Zine* and its contents in order to explicate its use, meaning, and value for polyamorous people to understand themselves and their relationships through autospeculation with their personal data. Lastly, I will describe a screener survey, interview protocols, and design research activity prompts that accompanied the *Polymap Zine* in a participatory design research study with polyamorous people.

In HCI and design research, zines have been used as design research instruments through deployments into the field (S. Fox & Rosner, 2016). These deployments can garner information about people's attitudes, reactions, and perspectives regarding the zine's content. Zines are more ideal than academic papers for interacting with laypeople, or people who are not academics, because they illustrate ideas in a more accessible manner. With more images and less text, zines provide a medium for interacting with people of various different communities that do not have academic expertise. Design kits have also been deployed into the wild (Altarriba Bertran et al., 2023; Bray et al., 2022; S. Fox & Rosner, 2016) in order to capture information from people in the contexts of their everyday lives. The process of developing these zines, design kits, and interview protocols are often under-documented in lieu of the final, polished research product. This chapter attempts to understand more deeply the design processes behind the Polymap Zine, Polymap Zine Kit, and design research interviews.

This chapter will explore and detail the development of a method, a zine, and a design

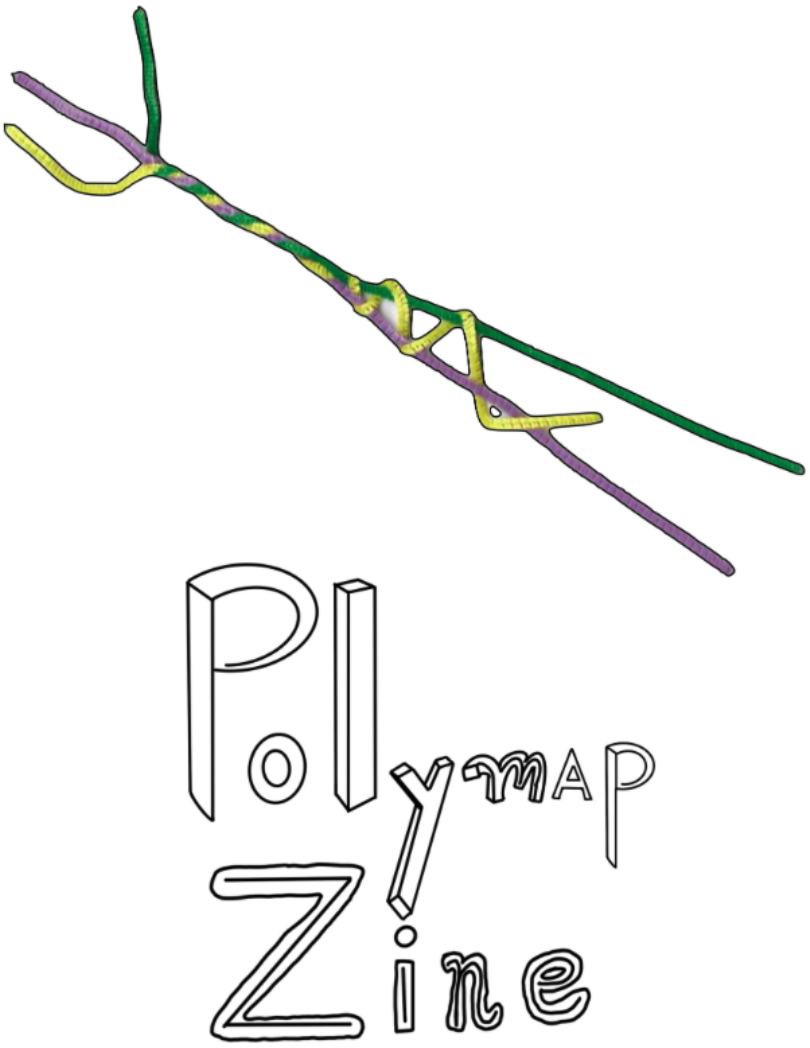


Figure 3.1: The cover page of the *Polymap Zine*

research activity that combines the method and the zine. The method of autospeculation is a means of reflecting and speculating in terms of one's own personal data (Kinnee et al., 2023). The zine is a probe and a medium for disseminating knowledge about autospeculation and how to autospeculate in terms of personal data. The design research activity functions by teaching participants about how to do autospeculation via the zine and the questions and activities that it prompts. The arguments of the chapter are the following: 1) that we might autospeculate with others collectively about polyamorous relationship formations through a design research probe in the form of a zine and a design research activity and 2) that we might build a toolkit for others to autospeculate on their own about polyamorous relationship formations. With respect to zines as design research probes, in HCI and design research, zines have been used as design research instruments through deployments into the field (S. Fox & Rosner, 2016). Zines can function as probes because they elicit responses from their audience, they can teach their audience via the content of the zine, and they can be easily circulated between and amongst different stakeholders in design research projects. This chapter builds on these rich traditions of design research probes and zines as design research probes through teaching participants about how to do autospeculation collectively and on their own. What's more is that design research with zines as probes is discursive (Tharp & Tharp, 2022), meaning that it creates a feedback loop between the researcher and the participant and facilitates a material means of interaction, inquiry, and acts as an object of conversation. This chapter outlines the process of designing a zine that functions as both a means of teaching participants how to engage in autospeculation while also providing participants with the means to share their lived experiences of polyamory.

3.1 Related Work

HCI and design research have long used probes of various kinds as a means of inquiring through and with designed objects and activities Boehner et al., 2007, 2012. Probes can vary greatly in their emphasis and interpretation, from Gaver, Dunne, and Pacenti's landmark cultural probes (Gaver et al., 1999) to Rosner et al.'s itinerant probes (D. K. Rosner et al.,

2016) that supersede the boundaries of fixed, static times and places. Scholars have adopted earlier frameworks for probes, such as Gaver et al.'s work, and fine-tuned the method to adapt cultural probes to inform design in sensitive settings (Crabtree et al., 2003). On a related note to Rosner et al.'s work on itinerant probes, scholars such as Altarriba Bertran et al. have deployed probes into "the wild" to facilitate co-design within nature culture. Still other design research on probes has sought after how to make the probes "work" the way they are intended to (Wallace et al., 2013).

3.2 The "Designing with Polyamory" Directed Research Group (DRG)

The DRG took place in Spring of 2023 over the span of a ten-week academic quarter at the University of Washington in Seattle. It was largely motivated by the following research questions:

> RQ1: *"How might we autospeculate with others collectively about polyamorous relationship formations?"*
>
> RQ2: *"How might we build a toolkit for others to autospeculate on their own about polyamorous relationship formations?"*

The first research question guided the development of the DRG, while the second DRG guided the development of the zine and design kit. The former emphasized collaborative processes of surfacing the main ideas, themes, and particulars of polyamorous relationship formations, while the latter emphasized the process of building a toolkit for self-guided autospeculation about polyamorous relationship formations. In addition to these research questions, participants were recruited with the following call for participants:

> *Overview and Call for Applicants* This DRG is seeking 2-3 people who have experience in, are currently practicing, or are thinking about polyamory. Polyamory is the practice of having multiple, consensual, emotional and/or sexual relationships. This DRG will research the intersections of polyamory, HCI, and design.

Students from undergraduate and master's programs are invited to apply and participate in this design research project. We are interested in working with people who have experiences with polyamory, are currently polyamorous, or who have been thinking about polyamory. We will explore ways of designing with polyamory through conversation, calendaring, historical investigation, reflection with personal data, everyday speculation, and data-driven divination.

Furthermore, we will unpack coexisting definitions of polyamory and polyamorous systems to forge new directions for understanding polyamory as defined by ongoing and reflexive processes of communication, consent, and co-designing ethical norms and standards. Moreover, we will draw upon our lived experiences of polyamory and polyamorous living through a series of design research inquiries.

Background and Motivation Currently, polyamorous communities are under-accounted for in the design of sociotechnical systems. At the same time, these communities have robust practices of iteratively developing their own terms of fairness, accountability, and transparency. While polyamorous communities continue to queer uses of technologies to fit their particular needs and sensitivities, they remain under-accounted for, stigmatized, and invisibilized in many ways. Therefore, this DRG will explore what we might learn from polyamorous communities in order to design more fair, accountable, and transparent systems using design research methodologies.

Summary In this DRG, we will investigate designing with polyamory through a series of engagements with archival, historical, personal, and temporal data in the context of HCI and Design. This DRG will develop design research methods for designing with polyamory through defining protocols, methods, and techniques for conducting design research with polyamorous communities, systems, and technologies. If you have any questions, please contact Brian Kinnee at bkinnee@uw.edu.

The DRG had four participants, including myself, all of whom were currently in or had previously been in a polyamorous relationship. The lived experience of polyamory was integral to the design of the directed research group because it centered the lived experiences of people who are or who have been polyamorous. All of the DRG participants had training in design and/or the arts, which impacted the subsequent development of the zine, design kit, and design research interviewing process.

The DRG consisted of weekly meetings in which DRG participants discussed readings about polyamory. For instance, the DRG read and discussed a piece of literature that is the earliest instance of research related to polyamory in the Association for Computing Machinery's Digital Library (Djajadiningrat et al., 2000). This helped provided a sense of when and where the field of HCI began to consider questions of polyamory and design. The DRG participants also read early versions of pictorial research about polyamory and design that used pipe cleaners to physicalize (Noortman, 2024) and model experiences of polyamorous relationships over time. This further attuned the DRG participants to questions about materially representing polyamorous relationships and designing for polyamory. Finally, the DRG read a paper that I had written to develop the method of autospeculation (Kinnee et al., 2023), which serves as the basis for chapter 5 of this dissertation. Together, this literature helped guide the DRG participants towards a collaborative process of material and designerly explorations of polyamory and relationship formations. Autospeculation served as a framework for each of them to reflect on and speculate about their experiences of polyamory. At this point, a greater emphasis was placed on autospeculation with lived experience than personal data. This development highlights the capacity for autospeculation and autospeculative approaches to design research to rely on memory and lived experience to guide processes of design and representation.

Over the course of the initial ten weeks, the DRG prototyped methods for capturing narratives about polyamory and creating representations of polyamorous relationships using everyday materials and digital drawing tools. This included the prototyping of activities, prompts, and protocols that would later inform a study about polyamorous relationships,

technology use, and personal data. For instance, I asked the DRG participants to "design a representation of your polyamorous relationships in the past, present, or future". This temporal framework and approach was inspired by Queer theorist and scholar Jose Esteban Muñoz's *Cruising Utopia*, which champions queer temporalities and queerness as a means of imagining different futures (Muñoz, 2019a). Polyamory and polyamorous people remain stigmatized and marginalized, and imagining different futures in this case means imagining poly-inclusive and chosen family-inclusive futures. I supplied the DRG participants with several pipe cleaners in order to complete the task, but they also encouraged participants to design with their own, other materials if they wanted to. Participants were given a week to complete the task of designing a representation of their polyamorous relationships in the past, present, or future. At the following weekly DRG meeting, participants were interviewed about what they each made. Participants were asked to describe the models of their polyamorous relationships that they had designed.

3.2.1 Participant 1 (P1)

Participant 1 is an art student at the University of Washington. At the time of the DRG, he was in a polyamorous relationship. Participant 1 decided to use his own materials to create their models of their polyamorous relationship. Instead of using the pipe cleaners that they were given, they opted to use copper wires and tubes. In Figure 3.2, a thicker gauge wire connects pairs of copper tubing along a curving, thinner gauge wire. When asked to describe the model that he had made, P1 responded with the following:

> P1: *So I have each of these sections of copper tubing, each one of them representing a person. And then there are twisted wires that bind these sections together with the thicker wire representing more of like a stronger relationship, maybe more of like a primary relationship. And then the thinner wire representing maybe a more distanced or secondary relationship. And on here, I think that like, I could probably continue this polycule much further, I just don't know the actual, the ac-*

> *tual history of the polycule myself, something I'd have to ask my girlfriend about. But in this model, this thinner wire connecting this other duo here would be like representing her dating a married couple, or something like that, where on the other end, my wire would connect to another person who is also polyamorous who, this other person only has maybe two more tenuous connections or something like that. Maybe they haven't found that person yet. But that's the model.*

P1's model illustrates several nuances of different kinds of relationships. First, it uses the language of *polycules*, or, molecule-like shapes of relationship formations, to describe the form and structure of the model and the relationships that it represents. Secondly, it uses material to represent strength of relationships and degrees of closeness, exclusivity, intimacy, and distance. Third of all, P1 represents relationship hierarchies in terms of primary, secondary, and tertiary relationships. This is distinctive because not all polyamorous relationships are hierarchical. Additionally, P1 states that in order to extend the model, they would have to inquire with their girlfriend for more information about the polycule. The polycule is something that he is a part of and yet, at the same time, he does not know all of the details about. P1 recognizes that his perspective within and just outside of the relationships in his model is partial. I then asked a follow-up question about the choice of copper wires and tubes to represent his polycule:

> Kinnee: *"What about the material itself?"*
>
> Participant 1: *"I mean, I think a lot of it was on hand, I think the malleability of it was something that was interesting just because it can change and it can be re-explored and these bonds, they might be able to be tightened or loosened perhaps. I think that I was also exploring just like the distance in between each of these connections I think that like these tighter bonds with this different wire, I also made them closer to each other. I think that you could, you could potentially have like a triad or a quad or something like that all loop together very tightly."*

Figure 3.2: P1's model of their relationships using copper wires and tubes.

P1 described using the copper wires and tubes out of convenience, because "it was on hand". It is important to note that P1 is an art student, and so they might have more ready access to certain kinds of materials, such as copper tubes and wires, than others. He then describes an interest in the malleability of copper because it allows for representations of relationships to be revisited and changed over time. He emphasized the potential for the connections between tubes to be tightened or loosened in order to represent the fluctuations in relationships over time. He also explored representing some relationships as closer by using a thicker gauge of wire to represent "tighter bonds". Finally, he mentions the speculative possibility of representing a triad (a relationship with three people) or quad (a relationship with four people).

3.2.2 Theertha (Participant 2)

Theertha used the pipe cleaners that they were given for the activity. She was not in polyamorous relationship at the time of the study, but she had the lived experience of being in a polyamorous relationship before. She described several of her relationships over time, each represented by a different colored pipe cleaner (red, orange, blue, and green). When describing the model that she had designed, Theertha indicated that she most closely identified with the green pipe cleaner. She described a "journey" of connections, entanglements, and disconnections over time:

> Theertha: *"...mine represents a journey. So it's across like time. So I have the red and the green. So all of these colors are people. And the red and the green met initially, and they separated. And the red and orange met, and then they became one unit. And then green was invited. And they were together at this junction, and then it didn't work out. And so red and green got back together again. And then blue and orange fuse. And then they were working privately for like a little bit separate from each other. And then green sort of separated from red and red, orange, and blue became one unit and then red left again to, y'know, get with*

green and then, sort of, they separate for like a little bit. And yeah, and then red, orange and blue became one unit and green is like on their own now. Yeah, so long term....But essentially, like, I wanted to show that people come and people go."

The series of entanglements and disentanglements that Theertha represented with pipe cleaners differs from Participant 1's model in that it illustrates a progression of relationships over time, rather than a fixed, static image of a relationship at a particular moment in time. Moreover, the material of the pipe cleaners affords a similar kind of entanglement physicalization that the copper wires provided in Participant 1's model. Theertha's model highlights the dynamism of relationships by materially representing points of connection and disconnection over time. Then, thinking with emotion-informed design (Balaam et al., 2019), I asked a follow up question about the emotional experience of designing the model of her polyamorous relationships over time:

Kinnee: *"What was your experience like making this in terms of your emotions?"*

Theertha: *"I guess what I was thinking was especially from the point of view of green, I feel like I kind of connected there I was like, 'Okay, I do go through relationships with people as phases. If I don't like it, I'm gonna like move back,' but then sometimes I kind of go back and normally get to it romantically but then I'm like, 'Yeah, we had a really good time when we were hanging out. So I would want to hang out with you more so I guess...'. I was feeling kind of excited for green to be like charting their own, you know, path among other people. But yeah, that's that's mostly it."*

Theertha's journey is highly personal and deeply encoded into the artifact on her autospeculation. Without the context that she provides, the artifact may not seem to tell a story at first glance. She reflects on her experience of connecting and disconnecting with

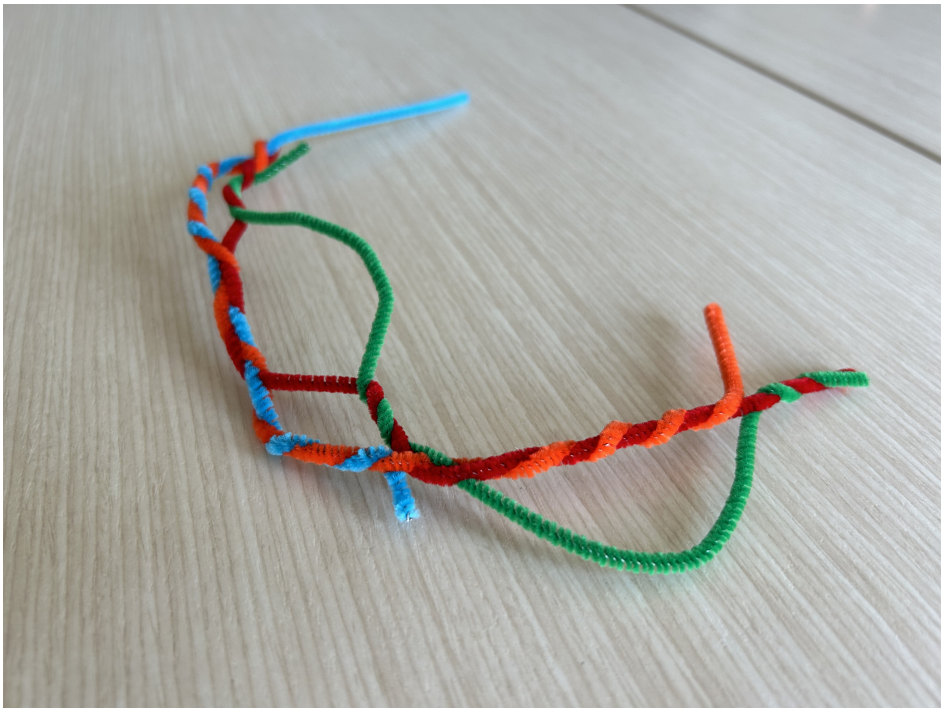


Figure 3.3: Theertha's model of her polyamorous relationships over time.

people over time as moments full of ups, downs, and uncertainties. What's certain is that relationships, for Theertha, have phases, rhythms, and cycles that can be understood relationally and temporally by representing polyamorous relationships through design with pipe cleaners.

Together, P1 and Theertha's models show that polyamorous relationships *can* be represented with everyday craft materials. What's more is that they demonstrate how relationships can be represented over time (as in 3.3) or as a snapshot in time (as in 3.2). Furthermore, these representations rely largely on memory and lived experience, which varies from later instantiations of the design research activity in which people were guided by the *Polymap Zine* to ground their autospeculations in their personal data. While these examples are, in comparison, ungrounded in personal data, they still deeply represent people's lived experiences of polyamory in materials terms. Grounding people's autospeculations in

their personal data became a central focus of the further development of the design research activity and the *Polymap Zine*.

3.2.3 On Models and Tangible Representations

One way of thinking about what DRG participants made is as relationship models. These models describe and project interpersonal relationships at various points in time. Another way of thinking about what the participants made is as tangible representations. Tangible representations are powerful because they provide a material and experiential mode of inquiry. In using tangible representations as research tools, researchers must practice great levels of care in terms of how they procure and store sensitive personal data. There are risks (which we will discuss later) to research that must be considered for each research project. For instance, tangibles may be labelled or annotated in ways that make personal information more readily known.

Tangibles offer a way for involving people in research projects to contribute on their own terms and in ethical, consensual ways. At the same time, tangibles offer degrees of abstraction that encode data—making their value like an artifact that must be interpreted by its creator. It is up to the researcher to steward tangibles as sensitive personal data that require consent to capture and to share. On this note, pseudonyms should be used in research with tangible representations of personal data.

Tangible representations could be used in the future to map various kinds of relationships. For instance, a design researcher might ask someone to make a tangible representation of their relationship to a particular technology or technologies over time. In this way, tangibles could be used to better understand patterns of technology use in terms of people's lived experiences and memories.

Autospeculation is for researchers who care about people's perceptions of themselves. Tangibles are a form of activity-based autospeculation. In addition to helping participants externalize their relationship forms, tangibles can be used alongside other methods in human-centered machine learning, such as surveys and participant-generated recordings (e.g. pho-

tographs and voice recordings). What tangibles add to the human-centered machine learning toolkit is a low-fidelity, accessible tool for testing machine-created models against research participant self-understandings.

3.2.4 Polyamory Vocabularies

Additionally, the DRG surfaced conversations and vocabularies about polyamory–unpacking words such as "compersion" (feeling joy for one's partner feeling joy) and "situationship" (a relationship that has been under-defined and/or is in a state of change). The need to coin and adopt new terminology to describe phenomena related to polyamorous relationships signals a need to adopt our design practices accordingly. Overall, the DRG was focused on mapping the particulars of polyamorous relationships, which eventually lead to its name as the "Polymap Zine".

3.3 The Polymap Zine as a Design Artifact

The following section will focus on performing a close reading of the *Polymap Zine* in order to examine and understand it as a design artifact. The *Polymap Zine* is eighteen pages in total, printed and stapled in a booklet format. The zine is carefully tucked within a bright pink envelope with a black and white sticker displaying the *Polymap Zine* logo. The full *Polymap Zine Kit* also includes nine pipe cleaners consisting of three different colors. This section will focus on the *Polymap Zine* at a page level, unpacking each page's purpose and meaning with respect to the broader research questions and design inquiry. Because the *Polymap Zine* is printed in a booklet, some of the pages featured in this section might appear off-center because the margins have adjusted to fit the form of a booklet.

3.3.1 The Polymap Zine Cover Page

The cover page for the *Polymap Zine* features a digitally manipulated image of three pipe cleaners, colored yellow, purple, and green, intertwined within a ladder-like shape. The pipe

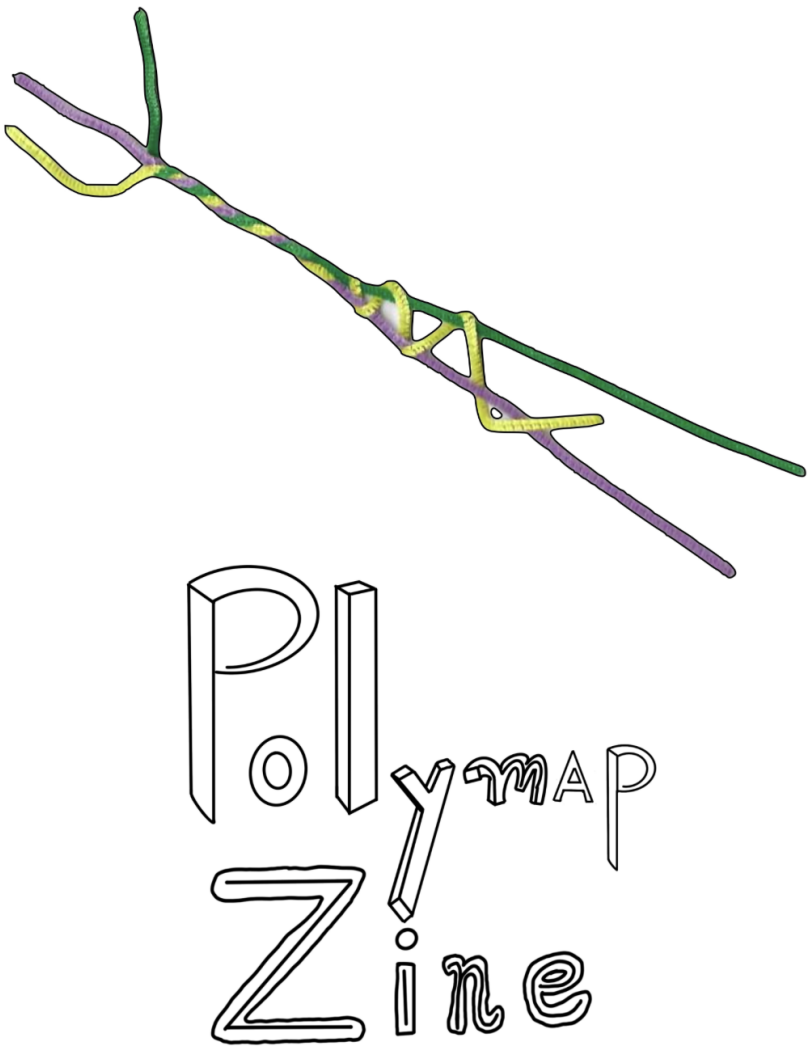


Figure 3.4: The cover page for the Polymap Zine.

cleaners are a representation of the my experience being in a V-shaped relationship with two other people at the same time, which was also the basis of the earlier design research inquiry (Kinnee et al., 2022) featured in chapter 1. Building on this lived experience of polyamory, I included this image as an example of the kinds of shapes that people might craft using the pipe cleaners to model their polyamorous relationships over time. Moving onto the textual features of the cover page, the *Polymap Zine* title was created using Procreate, an iPad, and an Apple Pencil. The pseudo-3D forms of the lettering is meant to express a sense of playfulness and whimsy–taking a potentially heavy topic of polyamorous relationships and turning it into something fun to explore instead. As mentioned earlier, the name *Polymap Zine* is intended to represent a process of mapping polyamorous relationships through reading and interacting with a zine. Finally, the zine's subtitle is "An Introduction to Autospeculation about Polyamory". The zine is meant to introduce people to the method of autospeculation within the context of exploring their polyamorous relationships, however, this is just the beginning. The zine aims to imbue its readers with the skills and know-how to use autospeculation within whatever contexts they desire. Polyamory is just one of many potential avenues for the application of autospeculation.

3.3.2 Designers' Statement

The designers' statement appears on the inside flap (second page) of the zine. It emphasizes that the zine was created by a team of designers, artists, and thinkers who have been in or are currently in polyamorous relationships. Members of the team drew on their lived experiences of polyamory to inform the design of the *Polymap Zine*. In order to highlight voices that are too often missing from design research, the zine facilitates self and group dialogues in order to capture polyamorous perspectives. The statement acknowledges that some of these conversations could be potentially difficult to discuss, and encourages readers to take regular breaks between exercises and prompts. The designers' statement also emphasizes that there is no time limit to engaging with the zine–thereby leaving the experience with the zine more open-ended. Moreover, the statement states the designers' hopes for the zine to help facil-

Designers' Statement

This zine was crafted by a team. Designers, artists, and thinkers who have been or are currently in polyamorous relationships drew on their lived experiences of polyamory to inform its design.

The zine facilitates self and group dialogues in the hopes of making capturable diverse voices too often missing from design research.

We recognize that these conversations could possibly be difficult to discuss, and we encourage readers to take breaks regularly between exercises and prompts. There is no time limit to engaging with the zine.

We hope for the zine to be an open-ended guide to help facilitate self-reflection, speculation, and discussion of polyamorous relationship formations and polycule living in a technology-saturated world.

Autospeculation is a practice that we believe can help polyamorous people better understand their relationships and their relations to others.

1

Figure 3.5: The designers' statement from the Polymap Zine, co-written by all four members of the "Designing with Polyamory" DRG.

itate self-reflection, speculation, and discussion of polyamorous relationship formations and polycule living in a technology-saturated world. Lastly, the designers' statement concludes by declaring:

> Autospeculation is a practice that we believe can help polyamorous people better understand their relationships and their relations to others.

The designers of the *Polymap Zine* define autospeculation as not only a method and methodology, but also a practice. This is meant to highlight the nature of autospeculation in which we can improve and become better at making astute observations about our personal data and ourselves through repetition and spending time with personal data. Furthermore, this posits autospeculation as a means for better understanding interpersonal relationships and relations to others. Autospeculation is a practice that can allow people to better understand their relations to others and themselves, which differs from understanding interpersonal and intrapersonal interactions in that it deals with longer, more drawn-out temporalities. Rather than dealing with interactions and interaction design, autospeculation in practice deals with the relations and relationality of interpersonal relationships–in this case, polyamorous relationships.

3.3.3 Dear Reader

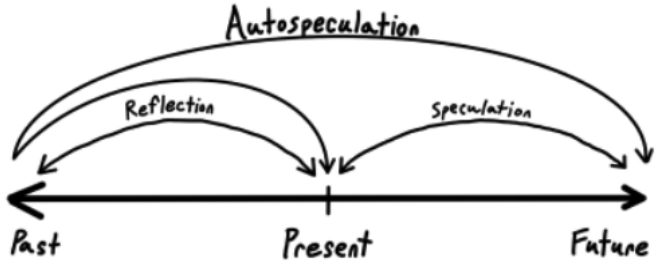
The next page, entitled "Dear Reader,", describes the zine as "an opportunity for [the reader] to reflect on [their] lived experiences of polyamory through a design research method called *autospeculation*". It defines autospeculation as "a process of reflection and speculation using personal data" and it invites the reader to take part in autospeculation on their own or with members of their polycule. At the bottom of the page, there is an illustration of a timeline depicting the different components of autospeculation. The timeline is labelled in terms of past, present, and future. It depicts reflection as a double-headed arrow between past and present, speculation as a double-headed arrow between present and future, and autospeculation as an act of moving from the present to the past (through one's personal

Dear Reader,

This zine is an opportunity for you to reflect on your lived experiences of polyamory through a design research method called *autospeculation*.

Autospeculation is a process of reflection and speculation using personal data.

We invite you to take part in these design research activities on your own or, if possible, with member(s) of your polycule(s).



Personal Data + Current Reflection about the Future = Autospeculation

2

Figure 3.6: An introductory page of the zine, entitled “Dear Reader,”.

data) and then forwards to the future–thereby encompassing both reflection and speculation. Finally, there is an equation below the timeline which states: "Personal Data + Current Reflection about the Future = Autospeculation". By describing autospeculation using a diagram and an equation, the goal of this page is to give readers multiple definitions of autospeculation in order to ground and outline the rest of the zine-guided design research activity.

3.3.4 Why Polyamory?

The following page of the zine poses the following question: why polyamory? It justifies the exploration of polyamorous relationships by emphasizing that polyamory is often left out of human-computer interaction research. It provides some example everyday technologies to illustrate the absence of poly-forward and poly-inclusive design. Instead, it states that "a bias exists to design for monocules.". *Monocules* are the opposite of polycules, consisting of a mononormative couple, and this term was coined for the purpose of highlighting the prevalence of mononormativity within our everyday lives. Lastly, Figure 3.7 states that "People who are polyamorous have particular needs and desires for technology design that this project helps to surface". This highlights the probe qualities of the *Polymap Zine* to elicit narratives and lived experiences of poly-inclusive and poly-exclusive design.

3.3.5 Risks of Autospeculation

This page of the zine is important because it outlines some of the potential risks of autospeculation. As discussed in earlier design research that used autospeculation (Kinnee et al., 2023), autospeculation poses potential risks to the autospeculator because it involves exploring and spending time with personal, historical data. This data may be charged in an indeterminate number of ways, with great nuance and the potential for the meaning and value of the data to change over time. Because the shelf life of personal data is not stable, it was essential to the *Polymap Zine* team that these risks be described prior to practicing autospeculation. Accordingly, the zine recommends that the reader take their time during

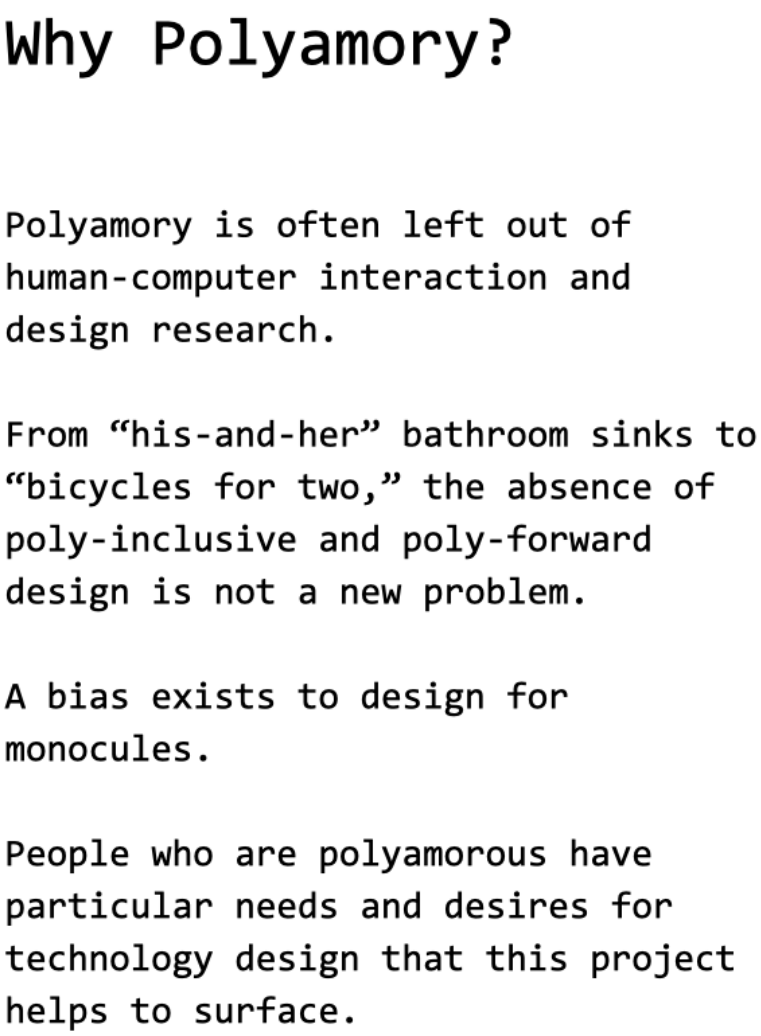


Figure 3.7: This page describes why the *Polymap Zine* explores polyamory and polyamorous relationships.

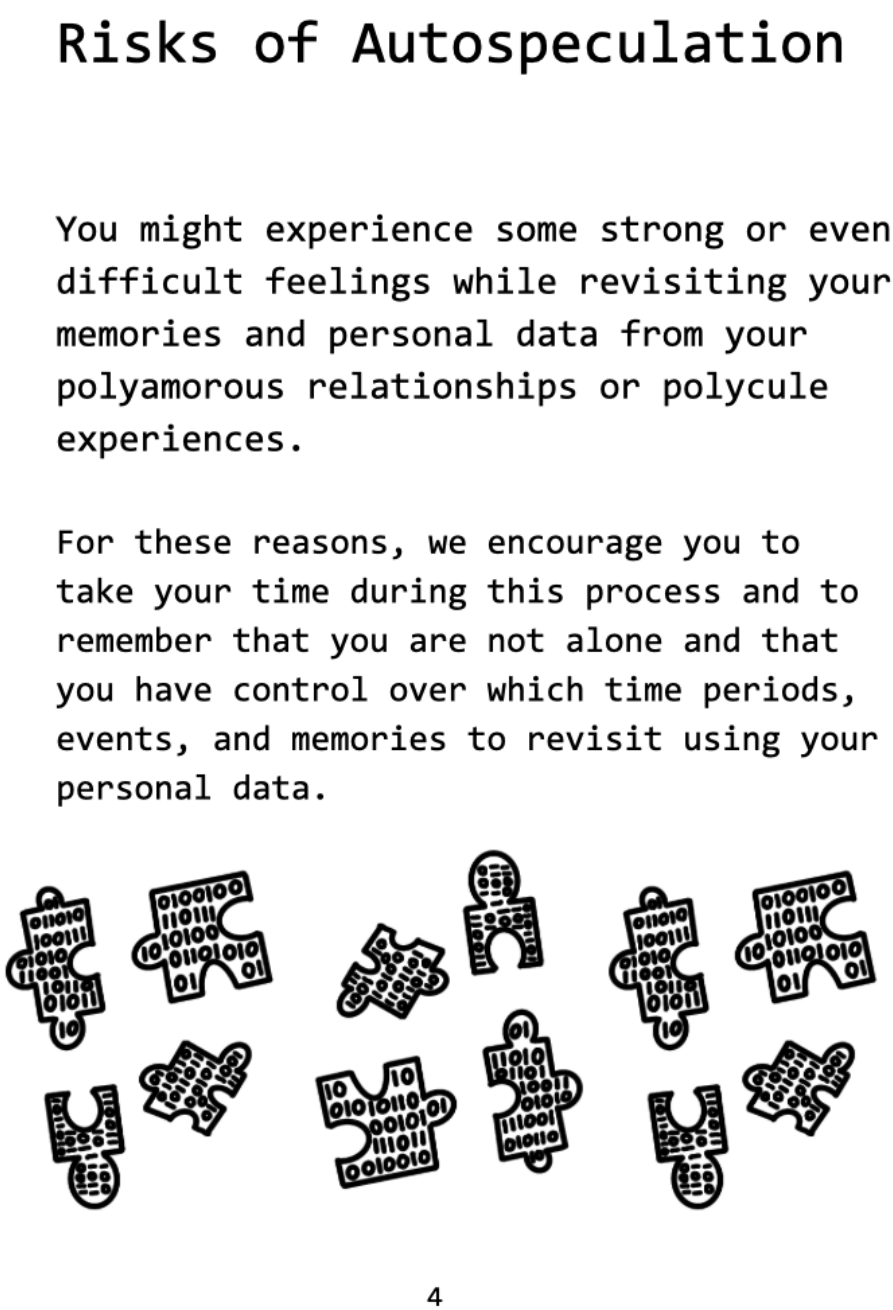


Figure 3.8: The risks of autospeculation may arise when revisiting personal data and memories. The zine outlines some safeguards and protective measures that can be taken to prevent and minimize harm and risk in autospeculation.

the process and keep in mind that they are the one in control over which time periods, events, and memories they revisit using their personal data. Below the text, there is a visual metaphor for autospeculation in the form of puzzle pieces with binary within them. It is meant to convey a message that autospeculation is a bit like solving a puzzle, with each puzzle piece encoded with bits and bytes of information that produce greater meaning when combined.

3.3.6 Starting Your Autospeculation

The starting point for autospeculation is personal data. Personal data is what grounds autospeculation because it allows for reflection and speculation *in terms of* lived experience and/or information that is particular to a particular person and/or community. Personal data is what ensures the position, accuracy, and situatedness of autospeculation by grounding reflection and speculation in lived experience, memory, and other personal records. Autospeculation, as this page of the zine defines, is "a design research method that encourages you to work with personal data as an entry point to a particular memory or lived experience". Then, the zine signposts that the next few pages will include resources for accessing personal data for autospeculation. Finally, building on the previous page about the risks of autospeculation, an illustration of a compass appears at the bottom of the page as a visual metaphor for navigating and remaining in control of the process of autospeculation.

3.3.7 How To Access Your Personal Data for Autospeculation (Part 1)

This page provides zine readers with four examples everyday personal data that are relatively easy to retrieve. This page highlights simpler technologies and data systems than the following page, which uses QR codes to provide links to download data from digital services and applications. In particular, this page prompts zine readers to read journal or diary entries, to look at calendars, to reread text/SMS messages, and to listen to voicemails. First, journal and diary entries have the potential to remind people of our internal monologues about the mundane and the spectacular. Secondly, calendar entries (whether analog or digital) can

Starting Your Autospeculation

Autospeculation begins with personal data.

Autospeculation is a design research method that encourages you to work with personal data as an entry point to a particular memory or lived experience.

The next few pages will provide resources to help you access your personal data for autospeculation.

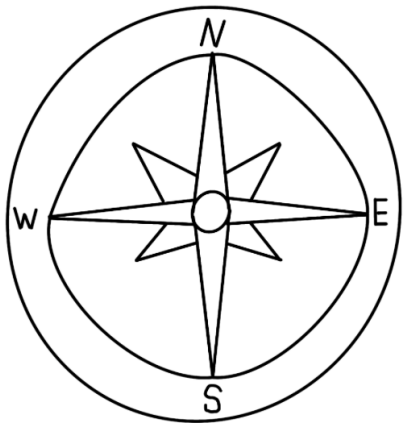


Figure 3.9: Personal data is a prerequisite for autospeculation.

How To Access Your Personal Data for Autospeculation

Read Journal/Diary Entries

1. Journal/diary entries can remind us of our internal monologues about the mundane and the spectacular.

Look at Calendars

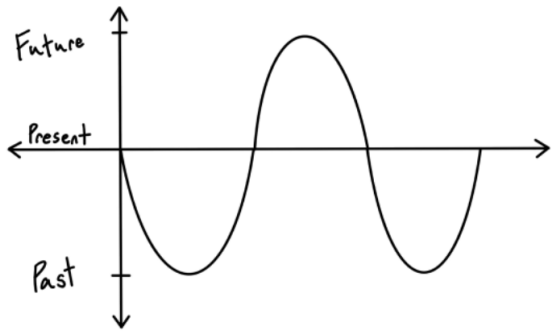
2. Calendar entries (analog or digital) can remind us of what we were doing, when, and with whom.

Read Text/SMS:

3. (Re)reading text messages can help us remember conversations from the past.

Listen to Voicemails

4. Listening to voicemail messages can help us remember the moment(s) that we received them.



*note: not all of these data retrieval methods are instant; some may take time to receive

6

Figure 3.10: How To Access Your Personal Data for Autospeculation (Part 1)

remind us of what we're doing, when , and with whom. Third, rereading text messages can help us remember conversations from the past. Fourth, listening to voicemails can help us remember the moment(s) that we received them. Lastly, an asterisk at the bottom of the page states that "not all of these data retrieval methods are instant; some may take time to receive". This is meant to alert the zine reader that some forms of data retrieval may be instant, while others (such as requesting personal data from large corporate entities such as Amazon) can take days, weeks, or even months or longer to retrieve.

Below these examples sources of personal data, a sinusoidal graph represents the movements through past, present, and future in autospeculation. First, autospeculation begins from the present moment. Then, personal data provides an entry point to the past. Next, reflecting on personal data from the past bridges a connection between the past and the present, returning to the midline. After that, the autospeculator engages in speculation about the future in terms of their own personal data. This draws connections between different possible, plausible, potential futures and the present moment. This process can continue until the autospeculator determines that there are no new findings from the autospeculation process, or, when they reach saturation in terms of autospeculation. What this illustration lacks is some sort of symbol, such as an ellipsis, to denote that the process of autospeculation is ongoing until the autospeculator decides to stop. However, it's a bit more complicated than "start" and "stop" with autospeculation. Autospeculation starts or stops in slippery ways. An arrow extends into space to represent the axis of autospeculation as ongoing and oscillating over time.

3.3.8 How To Access Your Personal Data for Autospeculation (Part 2)

The seventh page of the zine is a continuation of the sixth page of the zine. On this page, eight different personal data sources are presented with QR codes that link to related web articles. Each of the articles are beginner-level introductions to each topic. Some of the web pages are resources created by its respective organization, others were created by third-party organizations. Once again, an asterisk at the bottom of the page states that "not all of

How To Access Your Personal Data for Autospeculation

How to download your Google data	
Export your data from Google Calendar	
Request your personal info from Amazon	
How to export iPhone text messages to a PDF	
Transfer text messages from Android to a computer	
How to download a copy of your info on Facebook	
Access your data on Instagram	
How to download your data from Apple	

*note: not all of these data retrieval methods are instant; some may take time to receive

7

Figure 3.11: How To Access Your Personal Data for Autospeculation (Part 2)

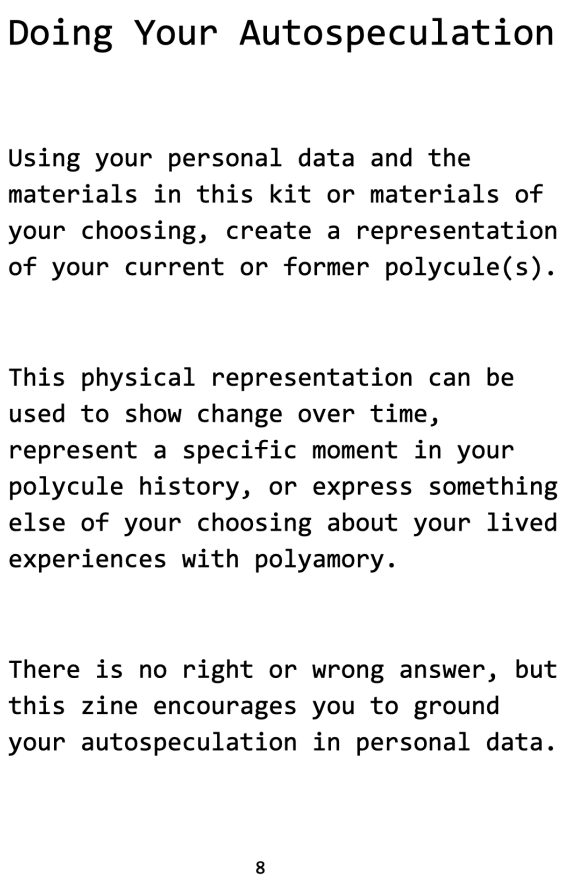


Figure 3.12: Doing Your Autospeculation

these data retrieval methods are instant; some may take time to receive". This is meant to alert the zine reader that some forms of data retrieval may be instant, while others (such as requesting personal information from large corporate entities such as Amazon) can take days, weeks, or even months or longer to retrieve.

3.3.9 Doing Your Autospeculation

On page eight of the *Polymap Zine*, entitled "Doing Your Autospeculation" the design research participant is given the following prompt:

> Using your personal data and the materials in this kit or materials of your choosing, create a representation of your current or former polycule(s).
>
> This physical representation can be used to show change over time, represent a specific moment in your polycule history, or express something else of your choosing about your lived experiences with polyamory.
>
> There is no right or wrong answer, but this zine encourages you to ground your autospeculation in personal data.

While this prompt emphasizes creating a representation of former or current polycules, participants would eventually also create future representations of their relationships. This might be related to the example artifacts of speculation that also appear later on in the zine (see section 3.7). For instance, the intention was to further ground participants' data in their personal data by encouraging them to spend time with their historical and present personal data before speculating about possible relationship futures. The second paragraph of the prompt further describes the temporalities of the designed representations and intentionally leaves the form of the representation open-ended for participants to imagine other, new ways of representing polyamorous relationships materially. Finally the zine reader is encouraged to rest assured that there is no "right" or "wrong" answer, but rather, the zine encourages its readers to focus on grounding their autospeculation in personal data.

3.3.10 Tips for Autospeculating About Polyamory

The *Polymap Zine Kit* also includes a series of tips, in the form of reflective prompts, for autospeculating about polyamory:

> Try reviewing your personal data and working with your materials in terms of the following prompts:

1. What does your personal data reveal and make you feel about your polyamorous relationships?

2. How does revisiting your personal data affect your understanding of your polycule or your experiences with polyamory?

3. What aspects of your experiences with polyamory weren't captured in your personal data?

The first prompt asks participants to consider what their personal data reveals and makes them feel about their polyamorous relationships. This prompts the *Polymap Zine Kit* users to consider how their polyamorous relationships are or are not represented in their personal data. It also attempts to put participants in touch with the felt sense of their data in terms of their polyamorous relationships in the past, present, or future. Therefor, this question encourages participants to engage with their polyamorous relationships and their data across temporalities past, present, and future. The second guiding question asks participants about how revisiting their personal data affects their understanding of their polycule(s) or their experiences with polyamory. This question asks participants to reflect on how the experience of revisiting their personal data might have affected their understanding of their polycule, or, of their experiences with polyamory more broadly. It provides an opportunity for participants to reflect on how their attitudes, thoughts, beliefs, and feelings about polyamory might have changed as a result of directly engaging with their own personal, historical data. Finally, the last prompt asks participants about what aspects of their experiences with polyamory *weren't* captured in their personal data. This prompt allows participants to reflect on the ways in which their lived experiences and data about polyamory might not be fully visible, retrievable, or accessible. It encourages participants to reflect on how and when data about their polyamorous relationships is or is not captured.

3.3.11 Example Artifacts of Autospeculation About Polyamory

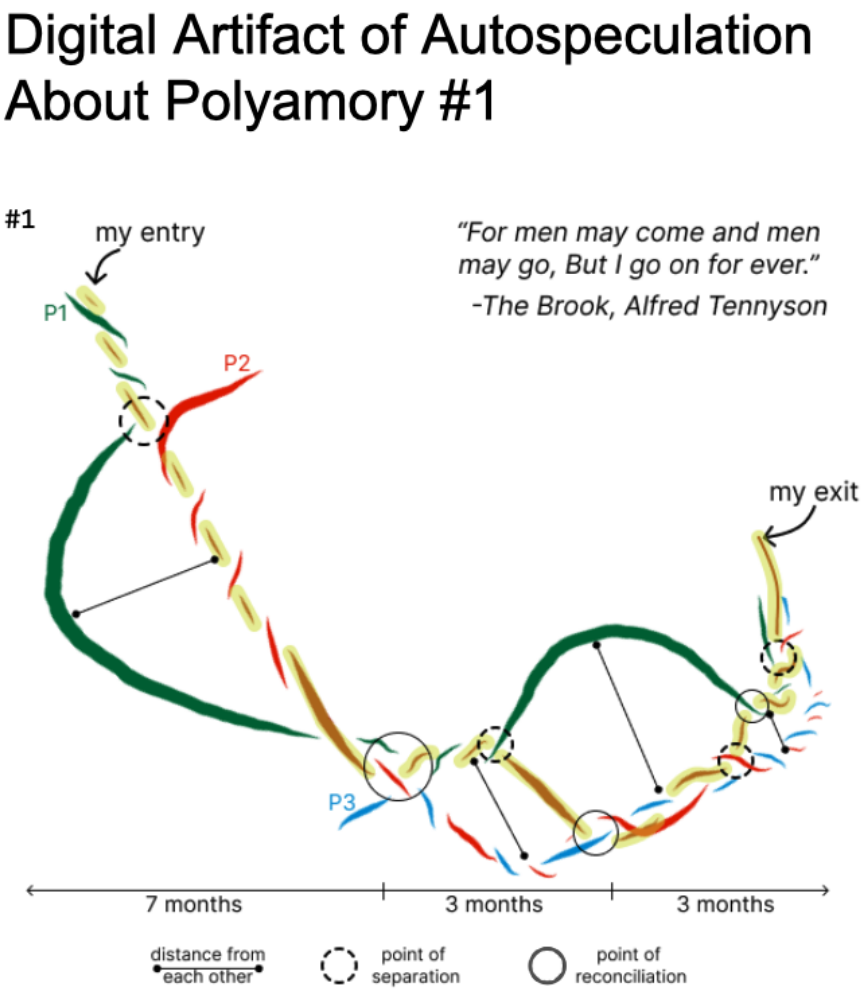
The *Polymap Zine* also includes a series of example artifacts of autospeculation about polyamory in order to help give participants a sense of what kinds of models can be created to represent polyamorous relationships over time. These examples are presented in terms

of digital artifacts (e.g. digital drawings of representations of polyamorous relationships) and physical artifacts (photographs of the pipe cleaner representations of polyamorous relationships) of autospeculation about polyamory. Some of these examples were created by myself before the *Designing with Polyamory* DRG, while others were created by DRG participants during the DRG or after the DRG during the collaborative zine-making process. In the *Polymap Zine*, these examples are separated in terms digital artifacts of autospeculation about polyamory and physical artifacts of autospeculation about polyamory. The goal of presenting both the digital and physical artifacts of autospeculation about polyamory is to provide participants with some examples of what people have designed through autospeculation with their lived experiences of and personal data relating to their polyamorous relationships over time. The examples are intended to provide inspiration, but not a strict prescriptive model.

Digital Artifacts of Autospeculation About Polyamory

The first digital artifact of autospeculation about polyamory is a digital rendering of a pipe cleaner model made by Theertha (one of the DRG participants). Theertha's digital artifact of autospeculation about polyamory is perhaps the most complex example because it features a timeline, points of entry and exit, markers of distance between relationships, points of separation, and points of reconciliation. This example appears first because it clearly illustrates polyamorous relationships using the pipe cleaners as dynamic representations of individual polyamorists intertwined and disentangled over time.

The second digital artifact of autospeculation about polyamory, designed by Participant 1, is a digital rendering of a polyamorous relationship at a particular point in time, or, a static snapshot. In contrast to the first digital artifact, in which Theertha physicalized her polyamorous relationships over time, Participant 1 designed a representation of their polyamorous relationship at a particular moment in time–just as they had done in their earlier representation using copper tubes and wires. In order to preserve and protect Participant 1's identity, I omitted all of the names that originally appeared in "Digital Artifact of Au-



A digital rendering of someone's polyamorous relationship over time. This was first crafted using pipe cleaners, then remediated using digital drawing tools.

Figure 3.13: A digital artifact of Theertha's autospeculation process.

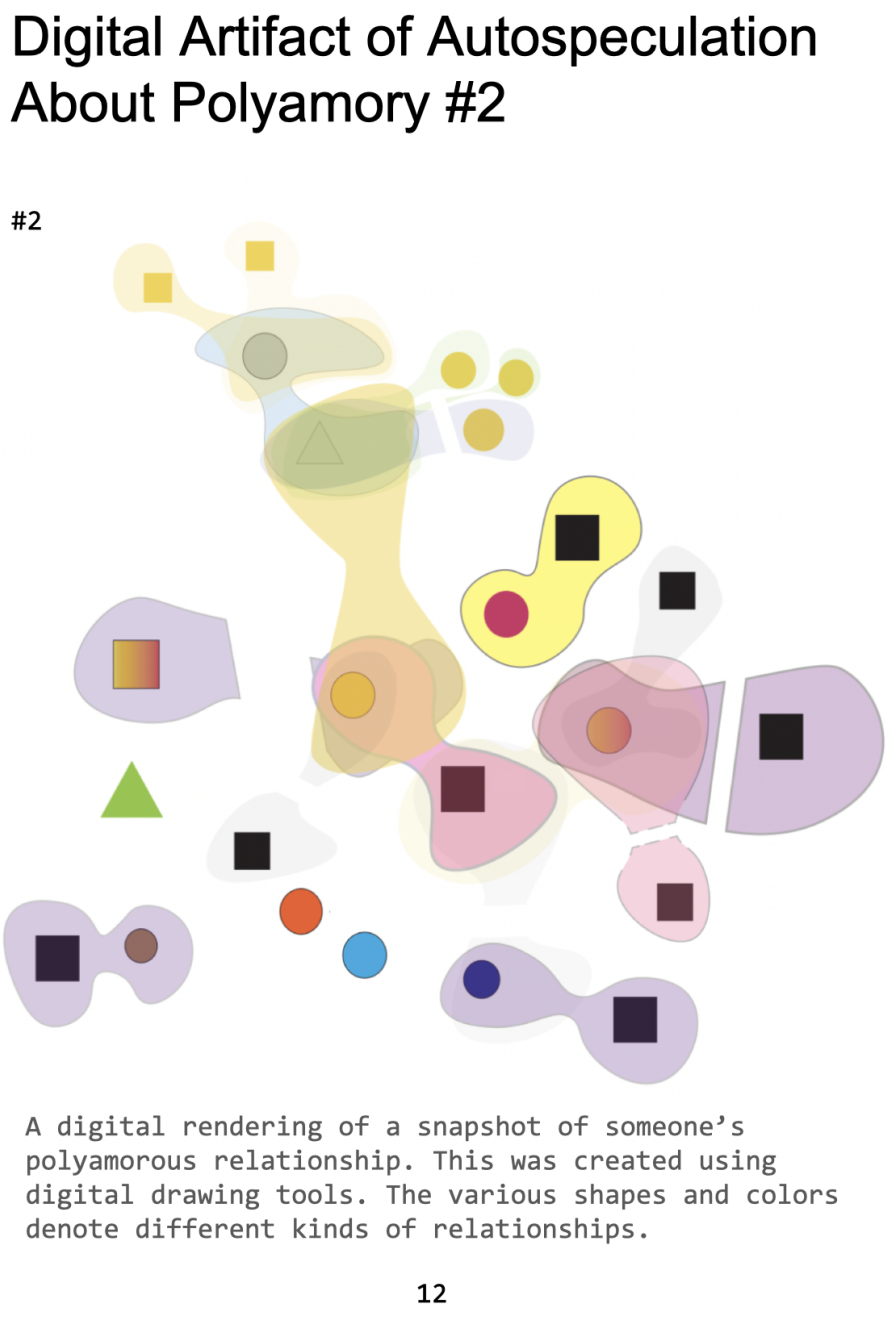


Figure 3.14: Participant 1's digital artifact of autospeculation about polyamory.

tospeculation About Polyamory 2" on the Figma board from the collaborative zine-making process.

Physical Artifacts of Autospeculation About Polyamory

Following the digital artifacts of autospeculation about polyamory, the zine features a series of physical artifacts of autospeculation about polyamory. I designed all of these examples in a series of preliminary experiments before the "Designing With Polyamory" DRG took place. The artifacts consist of some examples based on the first author's lived experiences of polyamory (3 and 4) in a V-shaped relationship. The other artifacts (1 and 2) depict speculative (in this case meaning not based on lived experience) polyamorous relationships between six different people over time. These artifacts are described as "physical" artifacts of autospeculation about polyamory because they are tangible, tactile models of polyamorous relationships over time. Unlike their digital counterparts, the physical artifacts of autospeculation about polyamory demonstrate the physicalization of polyamorous relationships using pipe cleaners alone. This means that they lack the additional layers of commentary and annotation that the digital representations have. However, the physical artifacts of autospeculation about polyamory have in fact been digitally manipulated in that they were not originally all in black and yellow. This re-coloring of the pipe cleaners was a leftover from an earlier attempt to publish this research in the form of a pictorial. It was pointed out by members of the TAT Lab and by some participants in the research study that the use of only two colors to represent polyamorous relationships could potentially traffic in narratives and assumptions of mononormativity. In order to circumvent this, the participants in the research study were given three different colors of pipe cleaners. Nonetheless, while the physical artifacts of autospeculation about polyamory might not be "perfect" examples, they still present a series of physicalizations and representations of polyamorous relationships that provided participants with some necessary context and inspiration for how they might complete the design research activity themselves.

The next page of the zine features "Physical Artifact of Autospeculation About Polyamory

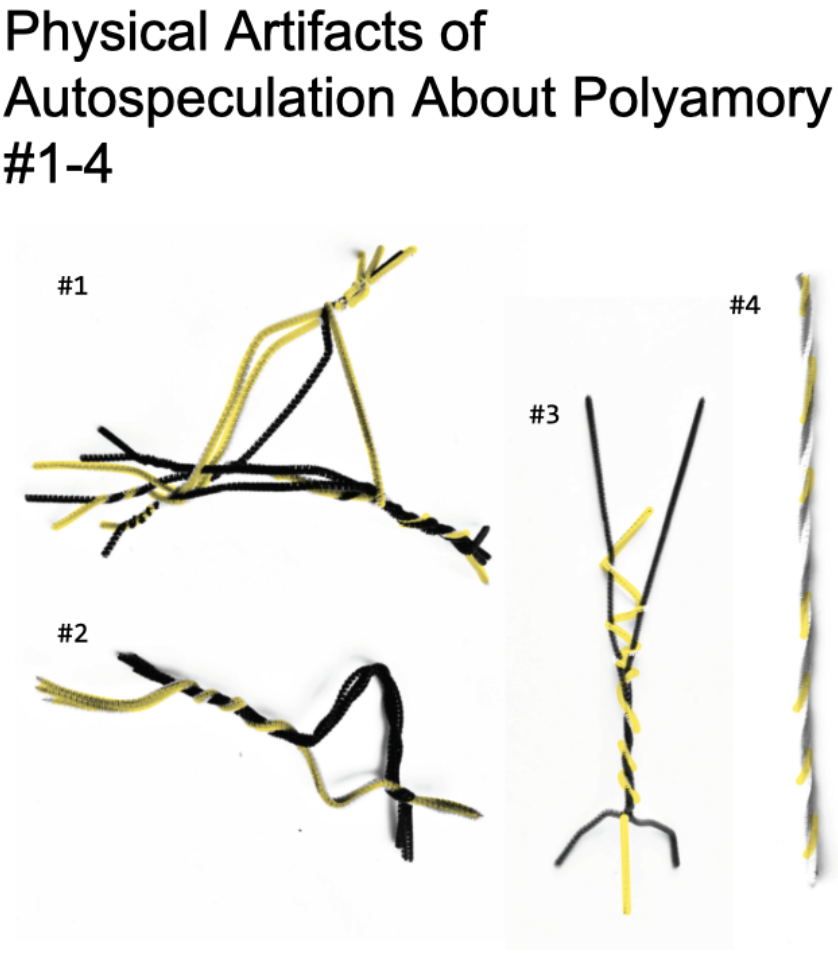


Figure 3.15: Physical Artifacts of Autospeculation About Polyamory 1-4

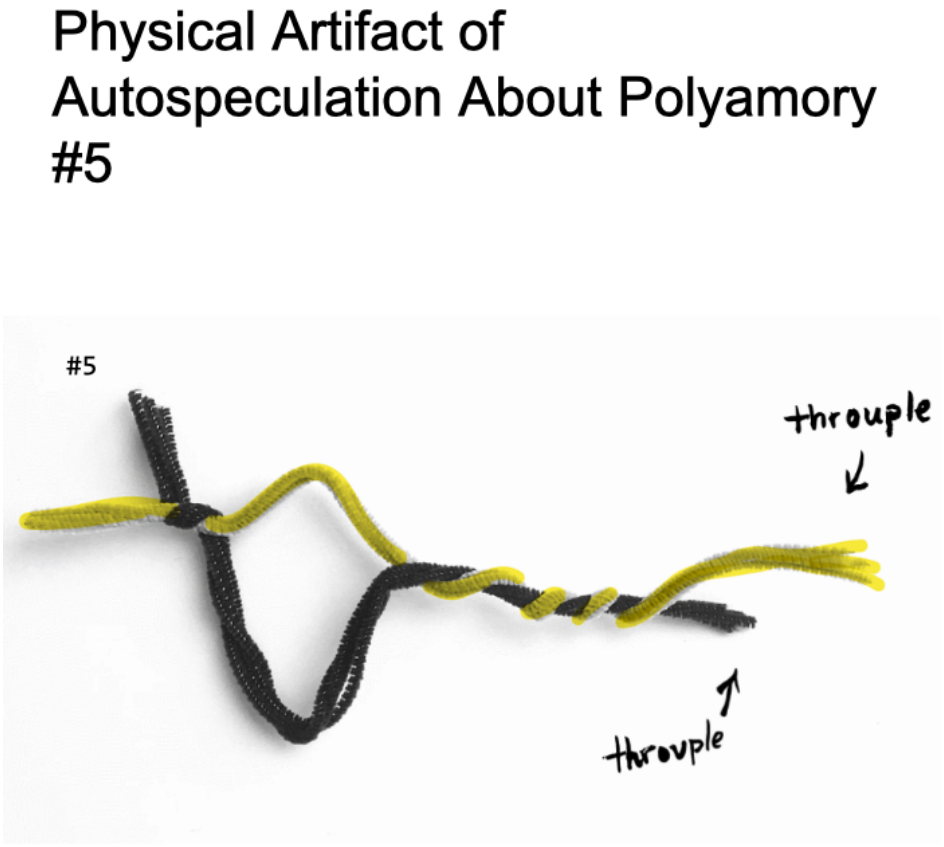


Figure 3.16: Physical Artifacts of Autospeculation About Polyamory 5

5". This physical artifact is actually the same as 4, but flipped upside down and with additional annotations. The fifth physical artifact of autospeculation is perhaps therefore a hybrid artifact, since it contains both an image of a physical object and digital annotations. It depicts two throuples that become entangled and disentangled over time. As stated before, this is a speculative depiction of a speculative relationship, and is not based on the first author's lived experience. Instead, it is an example of using the pipe cleaners to speculate about and imagine a kind of relationship that one has not experienced before. This example inspired several participants to design representations of polyamorous relationships that they would, could, might, or should imagine in the near or distant futures. The design research activity using pipe cleaners to autospeculate about polyamorous relationships therefore allows participants to engage in various facets of the cones of the futures that have been popularized, theorized, and critiqued by design scholars such as Dunne and Raby (Dunne & Raby, 2024) and futurist Stuart Candy (Candy, 2010).

3.3.12 What To Do With Your Autospeculation

This page is meant to help foster the beginning of post-autospeculation reflection. After doing autospeculation, the question remains of what to do with the insights that are gained and the information that might still be processing. Accordingly, the zine instructs the *Polymap Zine Kit* user to ask themself the following questions:

- What does this design research activity change or confirm about the way you interpret your lived experiences with polyamory?

- What does this design research activity change or confirm about the way you interpret personal data?

- What does this design research activity change or confirm about the way you think about your relationships in the future?

What To Do With Your Autospeculation

After using your personal data, the enclosed pipe cleaners, or materials of your choosing to autospeculate about polyamory, ask yourself the following questions about your autospeculation:

- What does this design research activity change or confirm about the way you interpret your lived experiences with polyamory?

- What does this design research activity change or confirm about the way you interpret personal data?

- What does this design research activity change or confirm about the way you think about your relationships in the future?

Figure 3.17: What To Do With Your Autospeculation

These prompts are intended to prompt reflection and speculation. The first question asks about what the design research activity changed or confirmed about the way one interprets lived experiences with polyamory. Asking about what has changed or what has been confirmed allows for comparison and contrast between their understandings of their lived experiences before and after the autospeculative design research activity. This gives people an opportunity to think about how the design research activity might have made them think differently or reinforced their thoughts and beliefs, and interpretations of their lived experiences with polyamory. This question is based on the past. The second question probes, in a similar manner, about the way one interprets personal data. Moving the focus from lived experience to personal data, this question encouraged reflection on how data informed their more nuanced and personal data-informed understanding of their lived experience. This question is based on the present. The third and final question asks about what this design research activity changes or confirms about the way one thinks about their relationships in the future. This prompts speculation about the future, and a future that is informed by autospeculation. This question is based in the future.

3.3.13 This Zine's Story

This page was included in order to document the people, process, and support involved in making the *Polymap Zine* and *Polymap Zine Kit*. It describes the "Designing with Polyamory" directed research group within the department of Human Centered Design and Engineering (HCDE) at the University of Washington as the origin of the project. It lists contact information for any follow-up inquiries and acknowledges its support from the HCDE diversity, equity, and inclusion (DEI) mini grant program. Finally, it provides a citation in case anyone wants to cite the zine in the future.

3.3.14 Notes and Reflections

The final pages of the zine include a series of questions and space for design research participants to write and/or illustrate their notes and reflections. These same questions were also

This Zine's Story

A group of designers, artists, and thinkers first developed the idea for this zine in a Spring 2023 Directed Research Group entitled "Designing with Polyamory" in the department of Human Centered Design and Engineering (HCDE) at the University of Washington.

In the Summer of 2023, the first version of this zine was created. The principal contributors were Brian Kinnee, Theertha Shetty, Aaron Beemer, and Renee Chien.

Subsequent versions of this zine are maintained and updated by Principal Investigator Brian Kinnee.

Contact bkinnee@uw.edu to share the outcomes of your autospeculations or to ask any questions related to the study.

Portions of this project received financial support from the HCDE diversity, equity, and inclusion (DEI) mini grant program.

Cite as: B. Kinnee et al., Polymap Zine. 2023.

Figure 3.18: A brief account of the *Polymap Zine*'s story and background.

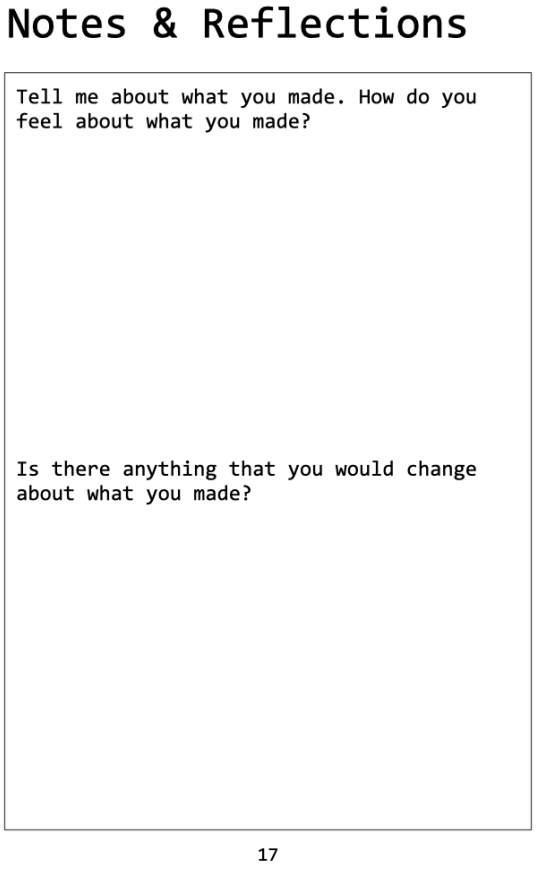


Figure 3.19: Notes and Reflections (part 1)

part of the follow-up interview, which will be described in the next section. The questions are the following:

- Tell me about what you made. How do you feel about what you made?
- Is there anything that you would change about what you made?
- What were you reminded of while making your representation(s) of your polyamorous relationship(s)

The first question asks the participant to describe what they made. It is an open-ended prompt that allows the participant to tell their pipe cleaner relationship model's story however they would like to. The follow-up question asks about how the participant feels about what they have made. This is a slightly different question, but it is an important difference because it invites the participant to share their overall feelings, beliefs, thoughts, and understandings of what the design artifact is and what it does. The next question asks if there is anything that the participant would change about what they made. This question can surface material limitations, such as having too few pipe cleaners, or not enough different colors of pipe cleaners. It can also surface conceptual challenges in physicalizing their complex relationships over time. Sometimes, this question confirms that the participant is satisfied with what they have made, and that no changes are necessary. Finally, the last question asks what the participant was reminded of while making their representation(s) of their polyamorous relationship(s). This question allows participants to share any associations, memories, or ideas that came to mind while they were doing the design research activity with the *Polymap Zine Kit*. It's an opportunity for them to recall what came to mind during the design research activity in order to further prompt reflection about their lived experience.

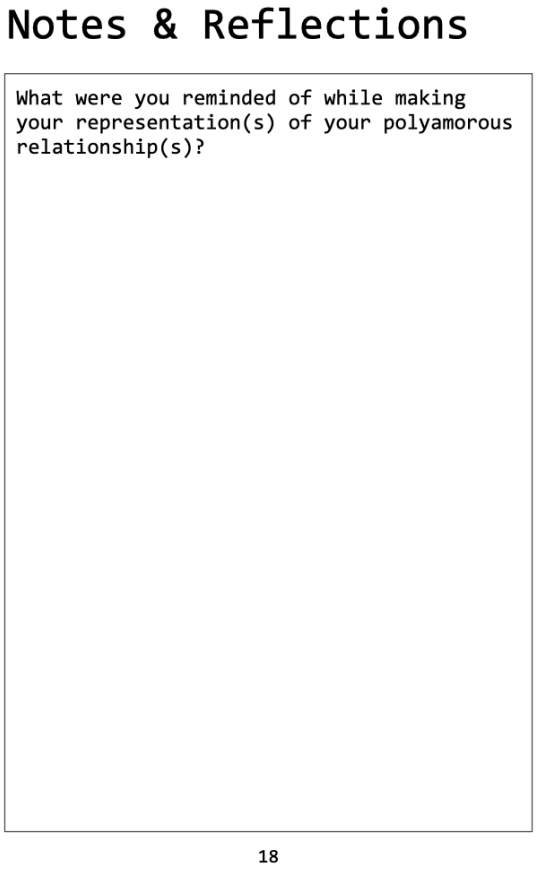


Figure 3.20: Notes and Reflections (part 2)

3.4 Surveys, Interviews, and Design Research Activity Prompts for the Polymap Zine Kit Deployment

Following the DRG, the DRG participants continued to collaborate in the process of designing a zine throughout the Summer of 2023. The Summer collaborations consisted of workshopping visual ideas in Figma in order to determine the visual motifs and themes of the Polymap Zine. Figma was also used to draft text for the zine's content. I used Google Slides to compile the images and to design the Polymap Zine in a booklet format. I also created a shared zine content strategy document to develop to zine's narrative and textual elements. By Autumn 2023, a full draft of the zine had been completed by the Polymap Zine team. This draft of the Polymap zine, and its accompanying zine kit, was then presented to the Tactile and Tactical Design Lab (TAT Lab) at the University of Washington for feedback before deploying the zines and the zine kit. The preliminary zine kit included a bright pink envelope, six pipe cleaners of three different colors (later changed the three pipe cleaners of three different colors), and a sticker with the *Polymap Zine* logo.

Some recommendations from the TAT Lab to improve the zine were to add page numbers, to use more than two colors for the pipe cleaners in order to supersede any dualities, binaries, or mononormative symbolism, and to add more context to the digital and physical artifacts of autospeculation that appeared. Additionally, the TAT Lab encouraged me to add notes for reflection at the end of the zine such as *"Can you tell me about what you made? How did you feel about what you made? What were you reminded of while making it?"*. These questions were also a part of the qualitative semi-structured interview protocol that informed the design research activity.

3.4.1 Screener Survey

In order to recruit participants for the interviews and design research activity who are or who had been polyamorous, I designed a screener survey. The goal of the screener survey was to identify individuals (or groups) who were currently in or had previously been in polyamorous

relationships, who were in the Seattle Metropolitan Area, who were willing to meet twice in person for the design research activity and interviews, who used technologies to navigate their polyamorous relationships, and who were interested in looking at and spending time with their personal data. The screener survey helped to determine potential participants for the interviews and design research activity. The screener survey also asked participants to share something about the last time they talked with someone about polyamory, which resulted in a wide range of responses.

3.4.2 Qualitative Semi-Structured Interview Protocol

The qualitative semi-structured interview protocol, as described by design scholar Tad Hirsch in (Hirsch, 2020), is an interviewing method that allows room for follow-up questions based on participants' responses. The interview protocol functions as a measure for ensuring that all participants are asked a core set of questions, but it does not capture all of the questions that might best asked in a conversation. My approach to qualitative semi-structured interviews is one that aims to displace traditions of interviewing as data extraction and instead turn it into a generative conversation for all parties involved. This approach to interviewing lends itself to the data analysis method of conversation analysis——an approach that HCI scholars have taken for decades (Norman & Thomas, 1991).

The First Interview

The design research interview and activity took place across two interviews. The first interview involved reading and signing a consent form and onboarding the participant to the study with the *Polymap Zine* as a guide for autospeculation about polyamorous relationships in terms of personal data over time. The overarching goal of the first interview is to learn about the participant, their relationship to polyamory and design, and sensitize them to the concept of autospeculation with personal data. The first interview lasted for about 45 minutes on average.

Prior to beginning the first interview, I read aloud a consent form describing the study, what it entailed, and any potential risks of the study. Also before beginning the interview, I asked if I could record the interview. I also emphasized that the participant has the right to say "no" to any question or refuse to answer any question at any time. Finally, before beginning the interview, I gave a brief answer to the following questions: *"What does polyamory mean to me? What does that mean in terms of design"*. This meant that I needed to be vulnerable with their participants, share some of their own personal relationship history, and then describe how it all relates to questions of design.

The protocol for the first design research interview was as follows:

1. Origin story: how did you get into this (polyamory)?

2. Relationship to Design: what's your relationship to design (if any)?

3. Reflection Methods: what are your existing reflection methods (if any)?

4. Gender and Sexuality: can you please describe your gender identity and sexuality?

5. Hopes and Fears: what are some recent stories where you reflected on polyamory in a hopeful way or in ways that have caused you concern?

This interview protocol is rooted in a series of conversations across the *Designing with Polyamory* DRG and subsequent collaborative zine making process. Each question resembles a theme from these collaborations. The protocol begins with a question about the participant's origin story with respect to polyamory. This question prompts the participant to reflect on their first experience(s) of polyamory. It gets the participant thinking about their polyamory history based on their lived experience and memory. Then, a question about the participant's relationship to design is asked in order to surface any immediate connections between polyamory and design. This question also provides an opportunity for the participant to share any of their own design expertise, which would provide another example of

intersections between polyamory (as in polyamorous people) and design. The next question asks about the participant's existing reflection methods (if any). This question potentially reminds participants that they are likely already practicing reflection with technology—even if they might not be aware of it (Bentvelzen et al., 2021). It also helps make autospeculation appear less intimidating because the participant already has some experience with reflection. The following question asks the participant to, if they are comfortable, share their gender identity and sexuality. This question reappears in the second interview protocol in order to avoid any assumptions that participants would have the same gender identity or sexuality at the time of both meetings. This question also allowed me to understand the participants in terms of their identity and which communities they were representing. Moreover, this data is relevant to the goals of DEI HCI, or Diversity, Equity, and Inclusion Human-Computer Interaction. Without capturing data about people's gender identity and sexuality, it is difficult to understand the intersections and makeup of the polyamorous community in terms of diversity, equity, and inclusion. Finally, a question about the participant's hopes and fears invites the participant to share any recent experiences of hope or fear in terms of polyamory. This question relates to the Muñozian queer praxis of having hope in the face of heartbreak (Muñoz, 2019b). It takes seriously the fact that polyamorous people experience ups and downs in relationships just like everyone else. It also holds space for the lifestyle of polyamory to be imperfect, and invites participants to share those narratives of imperfect experience.

The Follow-Up Interview

The second, follow-up interview was a shorter interview that lasted about 20 minutes on average. It occurred roughly a week after the first interview on average, which meant that participants had a week to practice and prepare their autospeculation and representation of their polyamorous relationships. An important aspect of the second interview was documentation of the participants' representations of their polyamorous relationships. The overarching goal of the second interview was to capture the narrative of the participants'

representations of their polyamorous relationships, to inquire about how polyamorous people experience the world and technologies in terms of mononormativity, and to understand what kinds of language they would prefer to be employed when they are referred to in the study. The follow-up interview included the following questions:

1. Tell me about what you made. How do you feel about what you made?
2. What kind of personal data did you use while making it?
3. Is there anything that you would change about what you made?
4. What were you reminded of while making your representation(s) of your polyamorous relationship(s)?
5. Are there technologies that feel particularly hetero/mononormative?
6. Are there technologies that are particularly liberating?
7. Can you please describe your gender identity and sexuality? What pronouns should I use when referring to you in the study?
8. What pseudonym should I use when referring to you in the study?
9. How have you learned the language of polyamory?

This follow-up interview protocol aimed to facilitate several things in the conversation. First, it gave participants an opportunity to share details about what they had made. It also prompted participants to consider and share how they felt about what they had made. Next, participants were asked about what kind of personal data, specifically, they had used while making their representation of their polyamorous relationships. This included a wide range of technologies such as, but not limited to, text messages, voicemails, calendars, Facebook Messenger, Instagram, and photos. The zine had included some of these technologies and

data sources, while others were chosen by the participants on their own accord. The next question prompts participants to consider if they would change anything about what they had made. Some participants shared that they would have liked to use more pipe cleaners, which lead to me always having extra pipe cleaners on hand during the initial interview. Other participants said that they would have cut some of the pipe cleaners to signal the end of a relationship, or to make a relationship shorter in duration. Still others said that they would not change anything about the representation that they had created. The next question asks participants about what they were reminded of while making their representations. Participants often recalled relationships or aspects of relationships that they had previously forgotten—which signals the potential for autospeculation and material elicitation as a memory device. The following question probes about heteronormativity and mononormativity in design, which several participants pointed out was an issue with social media and dating platforms. This question was included because the *Polymap Zine* intended to map the contours of polyamory–considering where it was included and where it might have been excluded. Drawing on the lived experiences of our polyamorous participants meant asking them about how they encountered heteronormativity and mononormativity (Pieper & Bauer, 2005) in their everyday lives. On the same note, but approaching the question from the opposite direction, the next question asked participants about which technologies they felt were particularly liberating. This question resulted in a range of responses across several different technologies such as Google Calendar, Feeld, and cloud-based apps like Google Docs. The following question asked about the participant's gender identity, sexuality, and pronouns. This question was repeated from the initial interview in order to avoid any assumptions that participants' identities remained static across the course of the study. I asked each participant these questions twice and noticed that some people's responses changed between interviews. They also noticed that participants sometimes used biological sex and gender identity interchangeably or in combination (ex. a "cisgender female"). The principal researcher reported participants' responses verbatim in order to honor the participants' identities and responses, as it is not reasonable to expect expertise from lay participants in terms

of in gender identity and/or sexuality. The following question was about which pseudonym the participant would like to go by in any future research publications or related materials (Kesewaa Dankwa, 2021). Some participants chose specific pseudonyms, while others provided other terms upon which the principal researcher was asked to choose a pseudonym. For example, some participants requested to go by any name *except* for those that begin with a particular letter of the alphabet. The final question asked participants about how they have learned the language of polyamory. This question resulted in a a variety of responses ranging from polyamory-specific literature such as Jessica Fern's *Polysecure* (Fern, 2020), to using dating apps (such as Feeld and Tinder), to lived experiences of polyamory. This question also surfaced terms such as *polysaturated*, referring to a state in which a polyamorous person is at a point of saturation with all of their relationships and cannot accommodate any more relationships.

3.4.3 Design Research Activity Prompts

Prior to the DRG, I had conducted a series of material experiments on my own with the pipe cleaners and the idea of designing with polyamory. The DRG then allowed me to further prototype the design research activity with two DRG participants to create a prompt for interviewees to engage in a design research activity with the pipe cleaners or materials of their own choosing (as shown in Figures 3.2 and 3.3). From these prototypes, I then drafted a design research activity prompt and shared it with their DRG collaborators in a Figma board to understand how people might interpret the prompt. The contents were then edited down to fit within the custom 5.5 x 8.5in. page of the zine in Google Slides.

3.4.4 Doing Autospeculation and Representing Relationships

This work draws from a category of design that seeks to use artifacts and toolkits to stage a kind of participant encounter (Boehner et al., 2012; Wallace et al., 2013), using designed things to open conversation with participants (Andersen, 2013; Boehner et al., 2007; Sanders & Stappers, 2014). The designed things in this case are the *Polymap Zine*, the pipe cleaners,

and whatever other materials the participants chose to design with in order to create their material representation of their polyamorous relationships through autospeculation (as in Figure 3.2).

In addition to allowing the zine and creative materials to prompt conversation, I opted to create a representation of my own polyamorous relationships at the same time as my participants. This was intended to further level the power dynamics between interviewer and interviewee by sharing a common task during the conversation. It also meant that each time I met with a design research participant, I would be creating a shared representation of my past, present, or speculative future relationships. This process, and the repetition of it across participants, gave me a deep understanding of the task that I was asking my participants to complete, what the memory work of recollecting, remembering, and representing their memories of relationships entailed, and the emotional contours of the design research activity that I had developed.

3.4.5 Grounding Autospeculation in Personal Data

In order to autospeculate in terms of polyamory, it is necessary to ground the autospeculation in personal data. Grounding autospeculation in personal data is what makes autospeculation a personal, situated process that attends to the particulars of lived experience. It is what makes autospeculation a form of reflection and speculation that attends to the particulars of the autospeculator's lived experiences, rather than making assumptions and casting speculations and/or judgments on others (Oliveira & Prado, 2015). Objectively, personal data can be a fixed record or ledger of lived experiences over time. Subjectively, personal data can be imbued with personal meanings that can change over time. This duality of objectivity and subjectivity in personal data renders autospeculation as a deeply personal process that uses personal data to ground autospeculation in particular lived experiences, events, or timelines that are specific to the autospeculator(s).

Chapter 4
PARTICIPANT RESPONSES

While chapter 3 focused on documenting the development of the *Polymap Zine* and design kit, this chapter focuses on the deployment of that zine and design kit. More specifically, this chapter documents in detail the experiences and stories of ten design research study participants. Design for couples has long dominated scholarship on technological development and use. The development of a design kit for polyamorous people to explore their personal data is, therefore, a novel contribution to design research and HCI. More recently, human-computer interaction and design research have begun expanding beyond the couple by paying closer attention to polyamory and polyamorous relationship formations. This chapter picks up this important thread by examining the deployment of a craft-based toolkit for making visible those often-invisibilized polyamorous relationships that develop with and through digital systems. This chapter also concentrates on what was found in participant responses. Drawing from twenty interviews and reflective and speculative craft-based activities with ten participants, I find that zines can quickly onboard participants to complex concepts around polyamory, evoke memories previously unarticulated, and support more polyvocal intimacy within design research. I end with a reflection on the mononormative assumptions baked into qualitative interviewing processes and the therapeutic potential of design research activities.

4.1 Introduction

In chapter 3, I presented the design process, intention, and details of the *Polymap Zine*. Here in chapter 4, I present the zine in action, with ten participants in a polyvocal format. As mentioned, design for couples has long dominated scholarship on technological development and use. From "his and hers" sinks to tandem bicycles, it is evident that many

Figure 4.1: The craft-based toolkit, with pipe cleaners and the Polymap Zine enclosed within a bright pink envelope.

technologies are designed with the normative relationship formation of the monogamous couple in mind. Consequently, non-normative relationship formations have been often overlooked and understudied in HCI and design research. To further complicate this, there are many competing definitions of "polyamory"–often viewed as a relationship status, a belief or preference, or a relationship agreement (Rubel & Burleigh, 2020). However, there exists a small-yet-significant corpus of HCI and design research that has begun exploring the terrain of polyamory and consensual non-monogamy (CNM). For instance, as early as the year 2000, the DIS community has explored design instances of polyamory such as polyandry, which consists of one woman and many men (Djajadiningrat et al., 2000). This early example is rigid in its gendered binaries and it considers the polyandrous person as an "extreme character". However, we posit that in 2024, the idea of polyamory is not quite as "extreme" as it once seemed. To be sure, relationship formations outside of mononormativity (Pieper & Bauer, 2005, 2006), that is, the conscious or unconscious assumption that privileges normative, coupled relationships over other relationship formations, have been and continue to act as alternatives to the mononormative nuclear family lifestyle.

More recently, HCI and design research have begun expanding beyond the couple by paying closer attention to polyamory and polyamorous relationship formations. For instance, Biggs et al. have recently studied the intersections of polyamory and rural queerness via performances of utopian futuring on TikTok (H. Biggs et al., 2023). Moreover, other prior work has studied experiences of consensual non-monogamy through autoethnographic design inquiry (Kinnee et al., 2022) and autospeculation-based methods (Kinnee et al., 2023), which will become central to chapter 5. In this chapter, I build on the emergence of polyamory and consensual non-monogamy across several ACM communities, with particular attention to its under-recognized prominence in HCI and design research.

As more people adopt and adapt to polyamorous lifestyles, such as consensual open relationships, there is a growing sense that, despite dominant social and cultural regimes of compulsory monogamy, it is okay to not be monogamous (Clardy, 2023). At the same time, people who practice consensual non-monogamy (CNM) and polyamory still remain

stigmatized and misunderstood in many ways (Rubel & Burleigh, 2020; Séguin, 2019), and this stigma only further perpetuates the forces that design against, without, or altogether invisibilize polyamory. In this chapter, I consider the ways in which we might instead design *with and for* polyamory.

This chapter picks up this important thread by examining the deployment and use of a craft-based toolkit for making visible those often-invisibilized polyamorous relationships with and through digital systems. Grounded in polyamorous people's personal data, we use autospeculation, or acts of reflecting and speculating in terms of one's personal data, as a tool for probing the lived experiences of polyamory with and through technology design and use.

4.2 Related Work

My work builds on existing literature across two important areas: (1) polyamory and design, and (2) material elicitation and speculation.

4.2.1 Polyamory and Design

In chapter 3, I provided an overview of mononormativity and design. Mononormativity is a term used in relationship discussions to describe the societal assumption that monogamy is the normal, preferred, or superior form of romantic connection. It implies that being in a single, exclusive romantic relationship is the standard, while other kinds of relationships, such as polyamorous or open relationships, remain less valid or acceptable. Critical psychosociology scholars Pieper and Bauer coined the term "mononormativity" in a 2005 landmark call for papers to describe the unquestioned assumption of monogamy's normalcy and naturalness in Western societies of the global north (Pieper & Bauer, 2005). In their words, "*mononormativity* describes a set of assumptions that privilege monogamy, assume monogamous relationships, and design for intimacy between two people"(Pieper & Bauer, 2005).

For design research and HCI, designing for intimacy between two people is the default

within long-distance relationships (LDRs) and computer-mediated communications (CMC), while non-monogamous design research is just beginning to emerge (Kinnee et al., 2022). To date, the vast majority of relationship-focused literature in design research is mononormative. Despite the relative importance of mononormativity in HCI, we found no entries in the ACM Digital Library for "mononormative" or "mononormativity" as of May 2024.

A small but growing body of work has begun to respond to this gap by investigating polyamory within and through design practices. A quick search in the ACM Digital Library reveals that twenty-eight articles in the ACM Full-Text collection have used the words "polyamory" and/or "polyamorous." Within these mentions, scholars have engaged polyamory and the polyamorous in several different forms. The earliest instance of "polyamory" mentioned within HCI and design research involves a fictional, polyandrous woman as a design persona. The researchers use the polyamorous persona to map, in their words, "extreme characters and situations" (Djajadiningrat et al., 2000). This reference to the drastic mirrors recent work by Blythe et al. who recently state that "these extremes [such as polyamory] can help to widen or narrow the design space"(Blythe et al., 2018).

Eleven years after its first mention, Kannabiran et al. use close readings of mononormative novel technology design to broaden discussions of intimacy (Kannabiran et al., 2011). This research built on Brewer et al.'s 2006 work on talking about sex in HCI (Brewer et al., 2006), but does not explicitly refer to "polyamory" or the "polyamorous". Since 2016, HCI and Design have begun identifying design opportunities for changing the context of "triadic" relations to one's digital possessions and personal data (Herron et al., 2016; Kinnee et al., 2022). In parallel realms of HCI research, researchers have designed online platforms with polyamorous people who are victims of disproportionate online harassment (Blackwell et al., 2017). Additionally, the field has begun recruiting, interviewing, and workshopping with people who have "different types of relationships" (Butt, 2017) and a "polyamorous lifestyle" (Kannabiran et al., 2018). For example, HCI researchers have studied how people manage polyamorous identities and presentations of self across different social media platforms and online communities (DeVito et al., 2018). More recently, Slupska et al. have analyzed the

management of polyamorous identities for personal safety through granular privacy settings (Slupska et al., 2021).

Moving from the individual to the institutional, scholars such as Edenfield have investigated the queering of institutional models of consent to include polyamorous and non-normative relationship formations (Edenfield, 2019). Meanwhile, Fernandez and Birnholtz have enrolled a polyamorous participant in research on self-disclosure and stigma in online dating platforms (Fernandez & Birnholtz, 2019). Recent research has highlighted conversations about using "Queer" as an umbrella term for historically marginalized sex, sexuality, and reproductive identities–including "polyamory" (Kannabiran, 2020). Similarly, researchers have begun exploring how polamorous people use dating apps when they haven't been designed for polyamory (Zytko et al., 2021) and enforce binary logics of monogamy versus polygamy (van Nuenen et al., 2022). Still other studies have focused on investigating relationships between "polyamory" and demonetization (Dunna et al., 2022), and probing political leanings of online polyamory communities and other "romantic minorities" (Massachs et al., 2020).

Other instances include unpacking representation of non-mononormative "couples" in queer indie games (Ho et al., 2022), understanding interaction goals and practices of polyamorous people in dating app use (Zytko et al., 2022), graphing relationships between polyamorous people who have at least one shared partner, or "metamour" (Gaar & Krenn, 2023), and analyzing instances of a "theoretical polyamory"—a gap between what exists and what is the ideal (Haigh, 2021). Most recently, Biggs et al. have studied the emergence of polyamorous online communities such as *#polyamtiktok*(H. Biggs et al., 2023).

Together, these works suggest that researching and designing with non-monogamous relationships presents an opportunity to design interactions and design with increasingly complex relations between people in polyamorous sociotechnical systems. Polyamory and ethical non-monogamy—the practice of participating consensually in non-exclusive romantic relationships—present a promising intellectual vista for further understanding how computing (chiefly AI and ML) systems relate to and interact with people in relationships that break

the dominant molds of mononormativity and mononormative design research (Baishya & Neustaedter, 2017; Chien & Hassenzahl, 2020; Nabil & Kirk, 2021; Yang & Neustaedter, 2020). Yet, beyond these key works, the role of polyamory in design research remains relatively under-examined. In the pages that follow, I consider what more this widened perspective on emerging relationship formations might do.

4.2.2 Material Elicitation and Speculation

In a second area of work, I draw from tactical and embodied approaches to speculative futuring, a set of methodological traditions we gather under the category of "material elicitation and speculation". Whether termed critical making (Ratto, 2011), discursive design (Tharp & Tharp, 2022), slanted speculation (Benabdallah et al., 2022), speculative craft, or fabulation (D. K. Rosner, 2018b; Søndergaard et al., 2023), these approaches involve creating openings and critique through material encounters. Craft and Do-It-Yourself (DIY) materials play a particularly notable role in these contexts, where their "lightweight" ((S. E. Fox et al., 2020), "embodied" (Schiphorst et al., 2013) and sometimes "subversive" (Chau & Croeser, 2023; D. K. Rosner, 2018b) disposition sits in contrast to the largely disembodied, rationalistic traditions of computational design (D. K. Rosner et al., 2018). This elevation of materiality as a site for contesting and reimagining projected futures often grows from speculative design traditions that challenge problem-solution engineering frameworks by using design practices to ask critical questions. For Wakkary et al. (Wakkary et al., 2016), for example, material speculation describes a process of making and examining a real artifact in situ—a counterfactual artifact—that does not match the conditions of its current world. The speculation then marks a clash between that counterfactual artifact and the current world, forcing people to imagine alternative worlds in which that artifact would exist. Our work draws from related but separate category of design that seeks to use artifacts and toolkits to stage a kind of participant encounter (Boehner et al., 2012; Wallace et al., 2013), using designed things to open conversation with participants (Andersen, 2013; Boehner et al., 2007; Sanders & Stappers, 2014).

I draw from the particular tradition of elicitation tools wherein designers use artifacts and material probes to examine contextual responses to design conditions and provoke expansive reflections on possibilities for design.

An important body of critical, feminist and decolonial design scholarship has pointed the limits of speculation and the need for critically situating its questions and capacities. Luiza Prado, for example, points to eight dimensions of "non- (or less-) colonialist speculative design"(Oliveira & Prado, 2015), including questions such as "Is my scenario/story/object somewhere else's local aspect/culture, appropriated as to fit my own?" and "Am I developing more 'civilised', 'highbrow' or 'educated' solutions for 'endangered' places in the world?".

My work takes heed of these important warnings and related lines of critique that urge designers to acknowledge legacies of epistemic and ontological violence tied to design, as well as work to realign and remake them. By turning to speculation as a critical theoretical pursuit, one grounded in anti-racist, crip, feminist or decolonial traditions, design scholars ask how designers might reimagine—rather than recenter or augment—existing suffering. Most notably for my work, I draw from my introduction of autospeculation (Kinnee et al., 2023), which will appear in chapter 5, a critical analytic technique that uses data practices for speculative self-reflection. Turning to a multi-sited polyamorous relationship, I used autospeculation to ground my experience in personal data and produce insights about my lived experience, grounded in my personal data.

I build from these discussions, and particularly autospeculation, to engage logics of minoritarian politics(Muñoz, 2019a)–speculating in terms of the groups we belong to and the relationships between them. In particular, I ask: what does it mean to speculate in terms of a polyamorous community? What does it take to reflect and speculate on the terms of community? With this orientation, I shift conversations on autospeculation from individuals to collectives, engaging each person with and through their relationships.

4.3 Methods

As described in chapter 3, we (the members of the "Designing with Polyamory" DRG) developed and used a craft-based toolkit for making visible often-invisibilized polyamorous relationships through reflective and speculative practices of autospeculation with personal data. I met with each participant during an interview where they explained and gave the toolkit to participants. For more detail about the toolkit itself, refer to chapter 3, section 3.3. In the interviews, I read aloud the contents of the zine (part of the toolkit) with the participants while answering any questions that arose. Prior to beginning the interview, I obtained written consent to participate in the study from all participants. Then, I shared a brief account of my own lived experiences of polyamory in order to situate the inquiry and level the dialogue between researcher and participant. Next, I gave the participant the craft-based toolkit containing the Polymap Zine and nine pipe cleaners within an envelope. After discussing the contents of the zine with the participant, the participant and I began to design representations of their own polyamorous relationships. While co-designing their relationship formation representations, I then asked the participant a series of questions about how they became polyamorous, their relationship to design (if any), their existing reflection methods (if any), and their hopes and fears about polyamory. Participants were given roughly a week to reflect on and practice autospeculation in terms of their personal data (such as diary entries, calendar data, text/sms history, and voicemail archive) using the Polymap Zine and the pipe cleaner models that they had created. Participants were instructed to attempt to create three representations of their polyamorous relationships in the past, present, or future. Then, in a follow-up interview, I asked each participant to reflect and elaborate on the representation(s) of their relationship(s) that they had made.

Additionally, I met with some people individually and met with other people as partners. This surfaced and challenged several assumptions about polyamory. For instance, interacting with polycule members as couples challenged the idea that polyamorous people can't have partners *and* be polyamorous at the same time. In fact, many participants discussed "pri-

mary", "secondary", and even "tertiary" partners to describe their relationships. Still others self-described as "solo poly" or as "relationship anarchists"–thereby resisting the very ideas of relationship hierarchies and polycules. The latter participants shared how, accordingly, they don't necessarily think of themselves as belonging to or being part of "polycules", but rather, a complex network of relationships through which they individually set the rules and terms of the relationship outside of other preexisting relationship models or structures.

4.3.1 The Kit

The material elicitation toolkit consisted of nine pipe cleaners and a zine, called the *Polymap Zine*, enclosed within an envelope. As mentioned, for further detail on the design of the *Polymap Zine* and its kit, see chapter 3 and section 3.3.

4.3.2 Data Collection and Analysis

The data we gathered through our interviews and material elicitations included interview transcripts, photos, and material artifacts such as the models we made together during our initial conversations. To analyze this data, we followed thematic annotation techniques (Charmaz, 2006), grouping excerpts based on how they shed light on our guiding questions around relationship formations and data practices. We then iteratively refined our interpretations based on insights and questions emerging from conversations among the research team (Burrell & Toyama, 2009), identified inconsistencies and tensions (J. Bardzell & Bardzell, 2016), and developed meaningful categories with which to revisit our data. In line with qualitative interpretive techniques, this approach emphasizes flexibility of our interpretations over consistency in terms of how we develop and apply our thematic categories and derive meanings, and driving the resulting categories of analysis described below (Burrell & Toyama, 2009). While we did this thematic annotation and worked towards categories, the way this chapter is presented is still by presenting each participant's story. This is meant to emphasize their individual experiences as well as offer a polyvocal presentation of findings.

Pseudonym	Pronouns	Gender Identity	Sexuality	Personal Data Type
Gabriel	he/him	femme man, non-binary	gay	digital calendar
Schedule C-EZ	they/them	cisgender man	bisexual	notion journals, Facebook
Nat	she/her	closeted, bigender	queer, demisexual	photos, notes
Bo	any	non-binary, transmasculine	queer	calendar, text messages
Crystal	he/they	trans person	pansexual, queer person	text messages, Google Calendar, Facebook Messenger, Instagram
T	she/her	non-binary trans woman	pansexual, sapphic	Google Calendars
Sweet	he/him	cis man	1.5 or 2 on the Kinsey Scale, bisexual	Google Keep, Excel, Telegram, Facebook Messenger
Spice	she/her	cis woman	2 on the Kinsey Scale, bisexual	Google Keep, Excel, Telegram, Facebook Messenger
Diane	she/her	cis woman	Gray ace, straight-passing, biromantic	Notion, Google Calendar
Charjabug	she/her	cisgender female	pansexual	Notion, Google Calendar

Table 4.1: Participant breakdown.

In section 4.4.2 below, after the responses, I will discuss the overarching themes that cut across participants.

4.4 Findings

Part of the *Polymap Zine* prompts its reader to look back through personal data as part of various reflective and speculative exercises. Participants chose to work with a wide variety of different kinds of personal data. This included, but was not limited to: Google Calendar data, other digital calendar data, note-taking apps like Apple Notes, personal diaries and journals using tools such as Notion, photo rolls, text messages, Facebook Messenger, and Instagram. Our interlocutors reported that Google Calendar is a technology that is particularly suited to the wants, needs, and desires of polyamorous people because it allows for coordination with and within their polycules. Additionally, participants such as Charjabug, T, and Sweet demonstrate the reflective capacities of Google Calendar by using it as an activity log of their dates over time with various partners.

4.4.1 Participant Responses

Before I look across the interviews, I describe each of the participants and the artifacts of their autospeculation about their polyamorous relationships using their own personal data. I share each participant's autospeculations in detail to foreground the nuances of the connections

they forged with their materials, their reflections, their data, as well as themselves. While design research typically foregrounds thematic analysis (Charmaz, 2006), I chose to first give voice to the people with whom the activities engaged. This approach not only makes space for a more expansive analysis, it also foreshadows the therapeutic nature of the tasks, an emerging facet of design inquiry that we analyze below.

Gabriel: Reflecting on Aspirational, Ideal Relationship Structures

Gabriel identifies as a femme, non-binary gay man who uses he/him pronouns and is currently in an open relationship. In response to our screener survey question of "Are you currently in or have you previously been in a polyamorous relationship?", Gabriel said:

> Gabriel: *"It's Complicated, unsure if open relationships qualify..."*.

Gabriel's question surfaced an important question for inclusion criteria, and the design research team opted to include people in open relationships under the umbrella category of *consensual non-monogamy*, which includes ethically non-monogamous relationship styles such as polyamory, open relationships, and swinging. In many cases, the difference between open relationships and polyamory is a matter of emotional exclusivity–in which open relationships practice emotional exclusivity between the two primary partners, whereas polyamorous relationships typically involve emotional attachment between more than two partners. Gabriel's perspective highlights the differences between different forms of consensual non-monogamy by pointing towards the distinctions between open relationships and polyamory as similar and related, yet different and distinct forms of consensual non-monogamy. For Gabriel, their ideal relationship formation was something that they had not experienced before in the past. After completing the first interview and then reflecting and speculating with his personal data for a week, Gabriel shared:

> Gabriel: *"I wanted to represent my aspirational, ideal relationship structure. So like, not necessarily something I've exactly had in the past, but what would be*

> *ideal. And part of the reason I was doing this is because I'm on the cusp of defining the structure of a relationship. So I thought it would be useful. And it was! I actually wrote down that I thought this could be a good activity for maybe therapists to do with polycules to define what they want from their relationships. But that's an aside."*

Gabriel's material exploration of an ideal, future relationship structure with and through the pipe cleaners allowed him to imagine what he has never had before in the past. Through autospeculation with his digital calendar data, Gabriel designed a representation of an aspirational future relationship structure that is based in a highly personal and particular image of his ideal open relationship. Gabriel also describes the process of autospeculation and material elicitation as "useful," which emphasizes the utility of autospeculation as a method for sense-making about consensually non-monogamous relationships. Additionally, Gabriel mentions as an aside that he "thought this could be a good activity for maybe therapists to do with polycules to define what they want from their relationships". Gabriel is not the only participant in the study who mentioned that autospeculation with and through the pipe cleaners might be a helpful activity in therapeutic contexts. For instance, Schedule C-EZ asked if he could bring his pipe cleaner representations to his therapy session. Gabriel's representation of his ideal, future relationship, which uses four pipe cleaners as the foundation on the structure, two pipe cleaners for each partner in the open relationship, demonstrates the differences between open relationships and other forms of polyamory and consensual non-monogamy with its emphasis on the occasional *comets*, or, ephemeral lovers that come and go over time. Furthermore, the doubling of pipe cleaners in the foundation of the representation signals the foundation of the relationship exists between the two primary partners of the open relationship.

> Gabriel: *"It's like, I think like, the poly people I know are like the best about communicating feelings, because they do it so much! So they make great friends!"*

Gabriel emphasizes the necessity of communication in polyamorous relationships. More

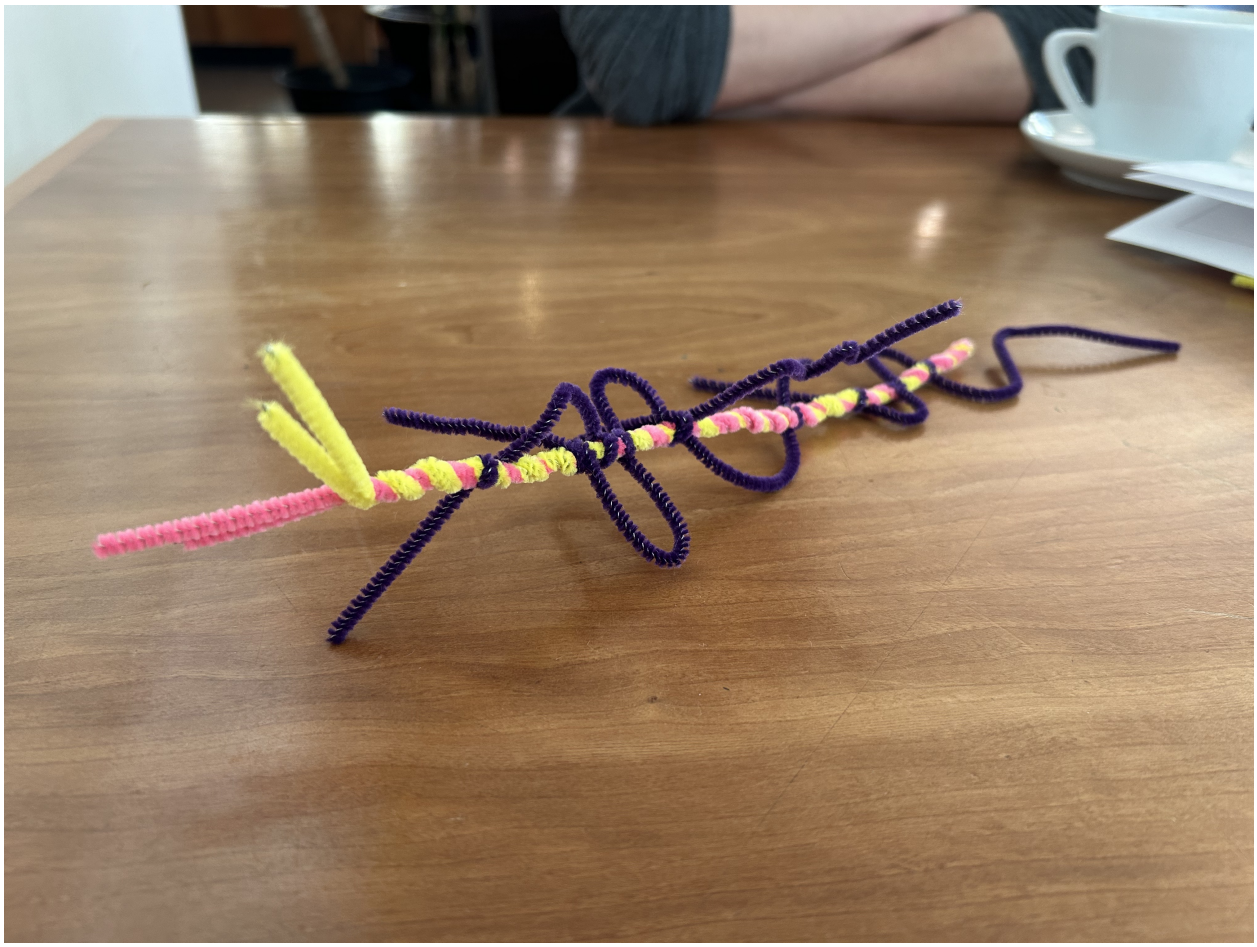
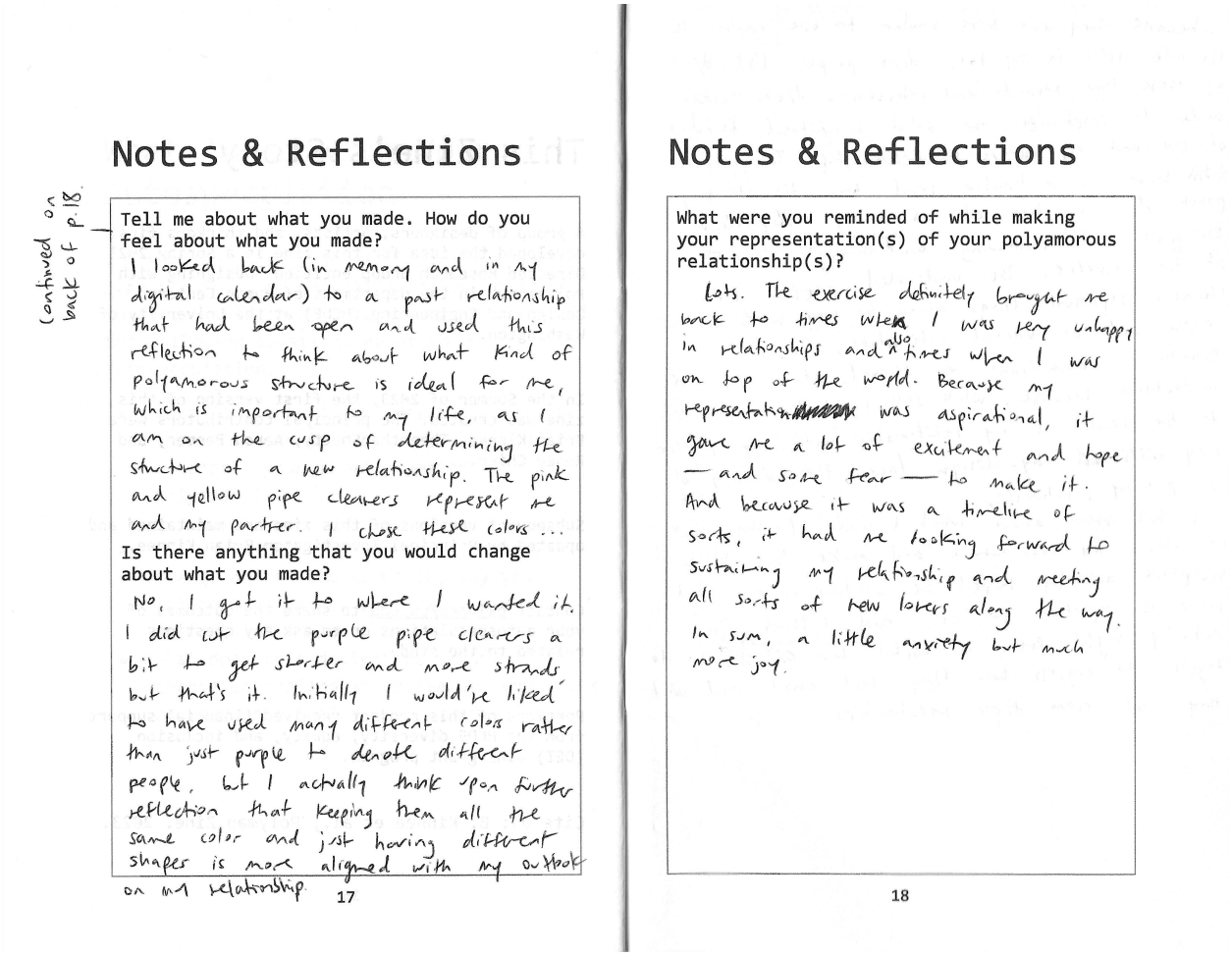


Figure 4.2: Gabriel's representation of his open relationship using pipe cleaners through autospeculation.



Notes & Reflections

(continued on back of p.18)

Tell me about what you made. How do you feel about what you made?

I looked back (in memory and in my digital calendar) to a past relationship that had been open and used this reflection to think about what kind of polyamorous structure is ideal for me, which is important to my life, as I am on the cusp of determining the structure of a new relationship. The pink and yellow pipe cleaners represent me and my partner. I chose these colors ...

Is there anything that you would change about what you made?

No, I got it to where I wanted it. I did cut the purple pipe cleaners a bit to get shorter and more strands but that's it. Initially I would've liked to have used many different colors rather than just purple to denote different people, but I actually think upon further reflection that keeping them all the same color and just having different shapes is more aligned with my outlook on my relationship

17

Notes & Reflections

What were you reminded of while making your representation(s) of your polyamorous relationship(s)?

Lots. The exercise definitely brought me back to times when I was very unhappy in relationships and also times when I was on top of the world. Because my representation was aspirational, it gave me a lot of excitement and hope — and some fear — to make it. And because it was a timeline of sorts, it had me looking forward to sustaining my relationship and meeting all sorts of new lovers along the way. In sum, a little anxiety but much more joy.

18

Figure 4.3: Gabriel's notes and reflections on autospeculation with the pipe cleaners.

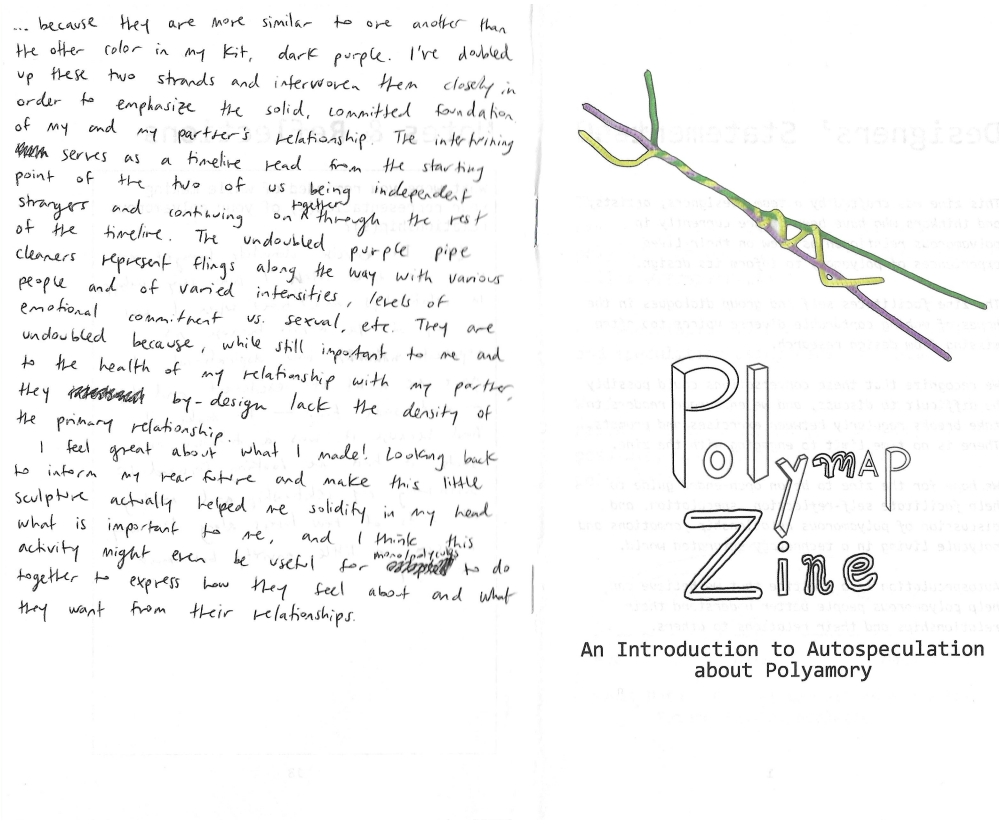


Figure 4.4: Gabriel's notes and reflections on autospeculation with the pipe cleaners (continued)

specifically, Gabriel highlights the frequency of "communicating feelings" in polyamorous relationships as a virtue that plays into their friendships in addition to their intimate relationships. The mediating of emotional attachments in their intimate relationships also plays out in their friendships, which Gabriel sees as a positive characteristic in friendships in addition to intimate relationships.

Schedule C-EZ: On Bias in Personal Data and Memory

Schedule C-EZ identifies as a bisexual, cisgender man who uses they/them pronouns. They work at a local non-profit organization that helps provide education and services for LGBTQ+ people, which was also the site of both interviews with Schedule C-EZ. Schedule C-EZ is in a

polycule with Nat. To ground their autospeculations in personal data, Schedule C-EZ used their personal notes and journal entries in Notion. In their first interview, they pointed out that certain technologies, such as "Spotify Duo accounts", are mononormative by design. Upon receiving the Polymap Zine, Schedule C-EZ exclaimed with an "Ah!" and "Ooh!" of excitement. During the reading of the Polymap Zine, while discussing the act of autospeculation as a series of reflections and speculations across past, present, and future, Schedule C-EZ asked if they could share a bit about their background. Schedule C-EZ described having a very active sex life as a bisexual man. They mentioned how different their lifestyle was before they had entered a committed relationship with a cis woman. They then mentioned how their partner began to date someone else, which prompted them to reflect more on their relationships in the past, present, and future:

> Schedule C-EZ: *"And I found out that basically, a lot of stuff that I thought was on autopilot was actually codependency that we developed during the beginning of the pandemic. So it, it meant that I had to do it, it's kind of nice to have like a little name to just like, write down like past and then like, think about the present and speculate about the future, but like, particularly like my experiences where I'm at right now, where I think our relationship is gonna go. So I was already doing basically journal entries on Notion. And like, also writing notes to myself and just kind of doing some check-ins and my partner's doing the same thing, too. And I have an excellent relationship now with like, my partner and my metamour. But you know, it was, it was, it was an adjustment."*

This passage suggests that Schedule C-EZ had already been engaging in autospeculation before engaging in the activity that we designed. This further evidences that autospeculation is often something that people already do, but might not be familiar with autospeculation as a term for reflecting and speculating in terms of personal data. Schedule C-EZ described that it's "kind of nice to have like a little name" for this process. They also describe how they were "already doing" autospeculation with their journal entries on Notion. They even

detail how "[their] partner's doing the same thing, too". While it is unclear exactly which partner Schedule C-EZ might be referring to here, Lastly, Schedule C-EZ describes how they've adjusted to their partner's partner, or, *metamour* after engaging in reflection and speculation about their polyamory over time.

Schedule C-EZ also mentioned that they had been reading *Polysecure* by Jessica Fern (Fern, 2020)–a text that several other participants also mentioned in their interviews as being helpful for learning and navigating the language and experiences of polyamory. For Schedule C-EZ, the text was recommended to them by their boss at a local community nonprofit dedicated to supporting LBGTQ+ people. Apart from reading *Polysecure*, Schedule C-EZ described learning the language of polyamory as *"just kind of going through life experience experiences, which is kind of a shopping mall way of doing it."*. They further described how they have co-navigated the process of learning how to talk about polyamory with one of their partners, Nat:

> Schedule C-EZ: *"[Learning the language of polyamory] is one the roughest things because like, you know, I will come up with stuff. And I will like, talk to Nat about it. And she's like, 'Oh, I didn't know this'. And then she'll tell me stuff like, and I'm like, 'Oh, I didn't know that'. Like, she taught me the phrase, the term 'polysaturated' recently."*

Later, after seeing some example artifacts of autospeculation in the *Polymap Zine*, Schedule C-EZ began to process the activity aloud:

> Schedule C-EZ: *"Okay, so these could be like timelines or these could be like moments....Okay, I kind of like this. I feel like I could go home to my parents and be like, 'this is how I feel!'"*.

For Schedule C-EZ, the pipe cleaner representations of polyamorous relationships were simple and clear enough that they felt they could show them to their parents. Their declaration of *"...this is how I feel!"* signals an identification with the pipe cleaner representations of

polyamory that matches their internal experience of those relationships. Later, Schedule C-EZ asked:

> Schedule C-EZ: *"Can I...would it be violating of any sort of like anything here if I were to like do this–not only share it with you, but also with like my therapist?"*

To which I replied:

> Kinnee: *"No, that wouldn't be violating anything."*

This conversation signals an interest on Schedule C-EZ's part to further explore, beyond the design research study, the meanings of the pipe cleaner representations of their polyamorous relationships over time. It also signals a high degree of investment from the participant in the design research study artifacts as tools for navigating psychological and emotional terrains of polyamorous relationships and the self. Schedule C-EZ then began to make their representation of their relationship while looking at their personal data. They chose to look at their Facebook, primarily navigating through images, beginning in January of 2020. Month by month, they coiled two pipe cleaners in varying degrees of tightness based on whatever memories the images from Facebook suggested:

> Schedule C-EZ: *"Come April 2020....I remember us also like having fights back then at least a little bit. So like, have us a little bit separate kind of like a big giant 'O', then tight, and then separate and then tight."*

They continued to work through their Facebook photos, month by month, until they realized that something was missing:

> Schedule C-EZ: *"...there's actually one more pipe cleaner I should have have gotten..."*

Schedule C-EZ had forgotten someone's partner in their polycule. They were not the only participant to remember a once-forgotten member of their polycule during the design research

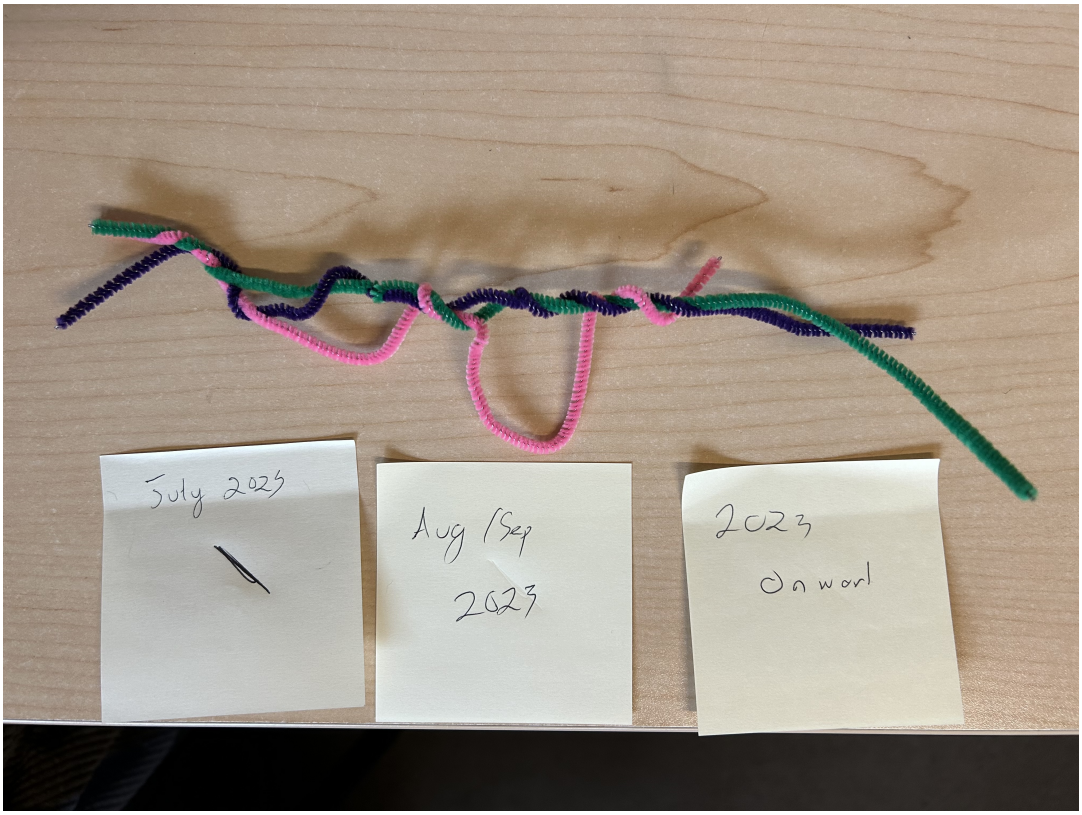


Figure 4.5: Schedule C-EZ's representation of their relationships from July 2023 to August and September 2023 and onwards.

activity (ex. T and Diane). This suggests that designing pipe cleaner representations of relationships might function as a memory aide for more fully recollecting complex relationship phenomena.

As Schedule C-EZ began to realize that they might not have enough room left on their pipecleaners to represent the span of time between 2020 and 2024, they said *"I could almost do like 17 pipe cleaners for this!"*. I handed Schedule C-EZ another handful of pipe cleaners. They then pivoted from using their Facebook photos to another source of personal data:*"I'm going to look at my Notion and see my journal entries."*. After looking through some of their journal entries, Schedule C-EZ stated *"So yeah, I think like, this is all great, but I think we need more pipe cleaners....definitely a little bit more time, but also like, more pipe cleaners."*. As they looked through their journal entries, Schedule C-EZ reflected aloud on a passage from the zine, which emphasized that sometimes what is *not* in personal data is just as important as what *is*:

> Schedule C-EZ: *"One of the things that you kind of mentioned with autospeculation is that like we don't–there's some missing gaps and I realize I'm not writing down stuff I definitely know I had fun with....as I kind of mentioned to you, I'm doing this stupid thing where it just like, I'm only writing down in my Notion journal when I'm having a bad time."*

Their reflection communicates an awareness of a negative bias in their own journaling practice. Through autospeculation, Schedule C-EZ became more aware of their own bias in their personal data.

For Schedule C-EZ, the granularity of their observations through Facebook photos and Notion journals was too great for the supply of pipe cleaners on hand. Their ability and style of reflection and speculation in terms of personal data and through the materials exceeded the capabilities and affordances of the pipe cleaners that were included the design kit. Although Schedule C-EZ was the only participant who expressed a need for pipe cleaners and time beyond the supply that was available, their response signal the material challenges of the

complexity and limitlessness of complex topics of polyamory, reflection, and speculation. We found that for some participants, more time and more pipe cleaners may be necessary.

Towards the end of the first interview, Schedule C-EZ reflected on their relationship with their partner and metamour while looking at the pipe cleaner representation that they had designed:

> Schedule C-EZ: *"Nat and I do not have the same relationship as we used to. It's– but it evolved into something better that's for us right now. And, yeah, looking at this, it's like, sometimes I'm kind of like, 'Why did I act that way? Why did they like bounce off that way?'. Like, had such a reaction, but like, looking at this, I can kind of forgive myself a little bit, you know? Oh gosh, this is–this will be fun therapy."*

In addition to the forgiveness that they felt towards themselves, they also noted the potential therapeutic effects of the design research activity. Schedule C-EZ looked forward to further exploring their relationships through the pipe cleaner representations as a form of "fun therapy".

In response to being asked about their orientation to design (if any at all), Schedule C-EZ shared that they think about the mononormativity of designed systems such as taxes:

> Schedule C-EZ: *"I do think about this a lot like how as you said, like, it's very mononormative, like a lot of stuff, I do taxes. And taxes, design wise, are terrible. But for poly people, they're absolutely horrendous."*

Schedule C-EZ explained that since the tax system only allows married people to file jointly or separately. There is currently no option in the US Tax system for people to file as polycules. On a related note, Schedule C-EZ described the complexities of mutual aid systems for polycules.

> Schedule C-EZ: *"I've heard horror stories about queer People having polycules, and they're all on mutual aid for each other. And that stuff gets toxic way fast*

> *because it's depending on people not just for emotional, sexual, and romantic needs, but also for like housing security, food security, all that other stuff. And that is–turns so toxic, so f*cking fast. And I've seen that of like a lot of queer people. So in some ways, mononormativity I do kind of push it because I do not want a lot of people that I can't exactly control or interface with without like some sort of like a private agreement."*

Schedule C-EZ identifies two gaps in the designs of the systems of taxes and mutual aid in which polycules and polyamorous people do not have a place. Their knowledge of taxes as technology allows them to understand the mononormativity that is designed into these systems. Their observations signal a keen awareness of the ways in which polyamorous people and polycules are under-designed for and under-accounted for in designed systems. When asked which technologies they found to be particularly liberating, Schedule C-EZ responded with *"I mean, I feel like Google Calendar in some ways."*. They then expanded this to include other cloud-based softwares, such as Google Docs, and services such as Notion because they use these technologies for journaling and relationship contract-making with their partners.

Nat: On Metamours, Beginnings, and Endings

Nat identifies as a closeted, bigender, panromantic, queer and demisexual person who uses she/her pronouns. Nat is in a polycule with Schedule C-EZ. To ground her autospeculations in personal data, Nat used a combination of digital photos and the Apple Notes application.

When discussing the example artifacts of autospeculation in the Polymap Zine, Nat shared a reflection on a triad relationship that her friend had experienced:

> Nat: *"I've seen it work for three years. Yeah, I have a friend who's married. She's been married since high school. And she's like, 99 percent sapphic. And her husband is the father of her child. But she dated another woman. And then because this other woman is bisexual ended up having a relationship with the husband, so they were like, she became the hinge between a married couple.... Yeah,*

> *it's really cool. Absolutely. And they're still like the two women are still together. Yeah, it's...polyamory's really cool!"*

The Polymap Zine, and the example artifacts of autospeculation that it contained, gave Nat and First Author a common visual, written, and spoken language for having a conversation about polyamory, design, autospeculation, and personal data. It also allowed participants like Nat to reflect on past instances of polyamory that they had encountered.

After a week between the initial interview and the follow-up interview, Nat arrived to the follow-up interview with an illustration based on their experience of autospeculation. She provided a detailed description of her polycule as it has evolved over time:

> Nat: *"So this is over time. So the longer ones are the ones that have been around for longer...So this just made more...is easier for me to understand mentally. So this is like the longest relationships so that longest line, but it's also friendship that started out, like, as a sexual relationship while he was you know, we were both in relationships. I kept them as a friend. When this sexual and romantic relationship ended, we stayed friends. This one we did not...And then, here, these are my current partners and their friends. And then they both have partners who are not romantic friendships that are sexual....Yeah, that's it. Like we were friends for awhile. didn't really talk much. But I knew them through [Schedule C-EZ]. Yeah, around pride this year. We reconnected. Yeah. This is my ex spouse, who is currently my friends. You know, we're still friends and then their partners. They had a breakup, I really should have drawn the friendship thing around here because I'm actually friends with her still! It kind of is like the poly thing to do is like, 'Oh, you breaking up with my meta, but I still want the meta.'"*

Nat's unpacking of her representation of her polycule over time reveals a rich network of friendships, romances, and sexual partnerships. She created a code for differentiating between these three types of interpersonal, poly relationships over time. For instance, Nat also noted that *"the ones that are brown or gray are not romantic anymore. And then the metas are*

the blue circles". Here, by using the term *metas*, Nat is referring to the metamours in the relationships. Nat also describes making the circles bigger for people who have more current influence or importance in her life. The code allows for a spatial and temporal representation of her polycule through a combination of Procreate for illustration and digital photos and the Apple Notes application for personal data to inform the autospeculation and subsequent representation.

When asked about how she felt about her representation of her polycule, Nat said:

> Nat: *"So I kind of thought of this as like a it's not a genealogy chart. It's not a web it's just kind of like...I plotted things by timeframe like 'When did I meet them?'. That's how far away they are so, yeah....honestly I was thinking about how relationships begin and end...just reminded of it."*

Nat's reflection on how she felt about her representation of her polyamorous relationships over time signals a heightened awareness of relationships as complex, dynamic, finite and ephemeral. She also highlights this idea in her written notes on page eighteen of the zine: "How relationships begin and end". The design research activity allowed her to autospeculate about her relationships past, present, and future through processes of reflection and speculation, which she further narrates in her written notes in terms of reflection and speculation.

Later, Nat reflected on how her relationships have changed over time as a result of becoming polyamorous:

> Nat: *"You know, I am a much more open person, I'm open to more different relationships now. I guess I can't, like, explain to people who are monogamous because they're so closed off to it. But I'm just like, 'I am trying to tell you like how much has changed my life for the better, and how less complicated my life is!'. People think you're more, it's more complicated. And it's like, the only thing that's more complicated is setting schedules, right?"*

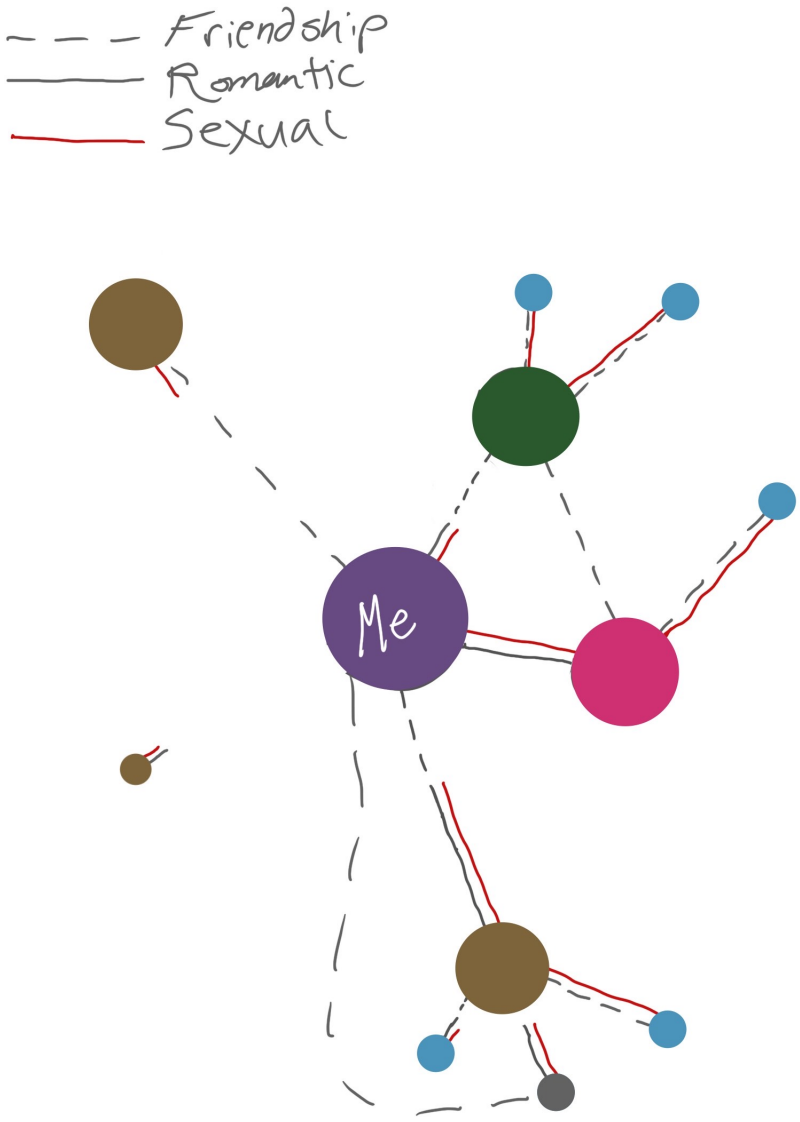


Figure 4.6: Nat's representation of her polycule using Procreate, digital photos, and the Apple Notes application.

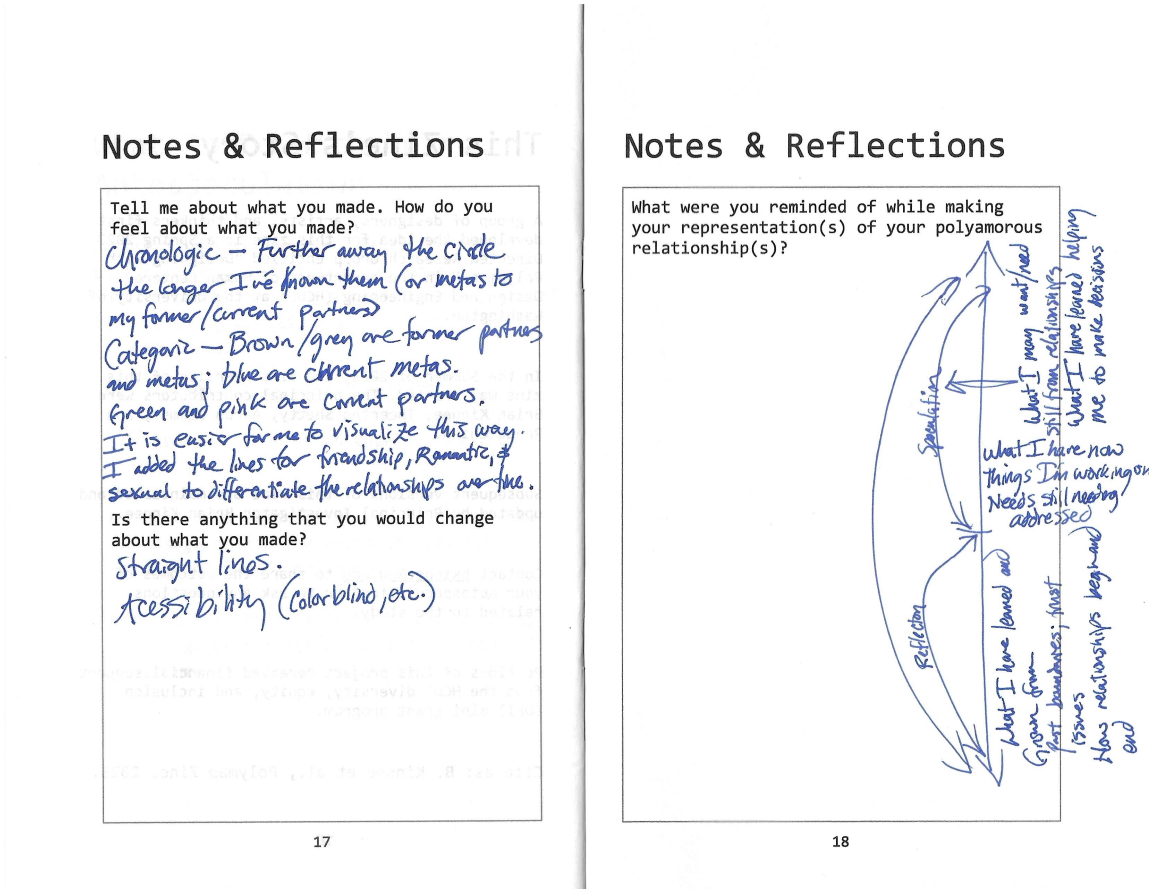


Figure 4.7: Nat's written notes, illustrations, and reflections in the *Polymap Zine*

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Nat expressed a sense of disbelief with some people's closed-mindedness to polyamory. She resisted the idea that being polyamorous is more complicated than being monogamous– with the caveat of scheduling. Interestingly, many participants in our study used digital calendar data to ground their autospeculations in their personal data. Nat's observation that scheduling is often more complicated for polyamorous people supports the idea that digital calendars such as Google Calendar are especially liberating technologies for polyamorous people because they allow for the complexity of coordinating across several people's schedules. When Nat was asked about what other technologies she found to be particularly liberating for polyamorous people, she first mentioned a collaborative whiteboarding app called Freeform. She described using Freeform to plan a road trip with Schedule C-EZ and another partner of hers. Additionally, she also mentioned the use of Google Docs and digital calendaring tools for managing her polyamorous relationships:

> Nat: *"And Google Docs is also another thing. Of course, Google Calendar and iCalendar. Those are things that like I think everyone uses to manage things. Like my partner puts all of the planning things and like our barriers and agreements and things like that on Google Docs, and we review it every so often, especially when we start dating other people, you know, pull it out, or like, this is our expectations and like you're gonna wear a condom for this, you're gonna tell me about any exposures, you know, make sure that they get STI testing. You know, those things are like very important to us."*

For Nat and Schedule C-EZ, Google Docs and digital calendars are effective technologies for managing the meetings, rules, and agreements of their relationship. What these technologies share is that they are cloud-based, synced technologies that provide the same information to all users. What's more is that these technologies are mutable in ways that allow for changes over time.

Finally, when asked how she learned the language of polyamory, Nat's reply was the following:

> Nat: *"I just kind of learned as I went. Is it ideal? Probably not. But it was what made sense to me at the time: talking to other polyamorous people that I wasn't meeting and learning by looking at poly groups and threads and things like that. What sort of things were looked down on in the community, what sort of things were like common. You start to pick up lingo pretty quickly. Yeah like KTP, compersion, you know all those things. So I don't think it's like gatekeeping in that way, because these are easily accessible terms."*

In this quote, "KTP" is an acronym for "Kitchen Table Polyamory," which is a form of polyamory in which people are relatively close, emotionally and socially, to their metamours (their partners' partners) in addition to their own partners. Compersion refers to "The feeling of happiness, joy or pleasure that comes from delighting in other people's happiness. In nonmonogamy, this term is specifically used to refer to the positive feelings experienced when your lover is having a positive experience with one of their lovers"(Fern, 2020). For Nat, the representation of polyamory that she experienced in books was underwhelming and instead representative of *"the things that [she] didn't want out of polyamory"*. Instead, Nat became familiar with the language of polyamory through lived experience and seeking out information about words that she encountered in various online groups, forums, and threads.

Bo: On Hope and Polyamory

Bo identifies as a non-binary, transmasculine queer person who uses any pronouns. They describe how the use "any" pronouns as a way of making it impossible for people to misgender them. To ground their autospeculations in personal data, Bo used a digital calendar and text messages. During their first interview, used the pipe cleaners to design a representation of their polyamorous relationships. Then, during the follow-up interview a week later, they shared a representation of their romantic and platonic connections over time that they had created using digital drawing tools. Bo describes alternating between monogamy and polyamory over time. At the time of the interviews, Bo was not currently polyamorous,

but they were still able to engage in the design research activity because of their history of polyamorous relationships. In order to ground their autospeculation in personal data, Bo described the following:

> Bo: *"I mostly relied on memory, but I did reference my calendar and text messages to remind me of loose timelines and relationship overlaps."*

In Bo's case, reflecting on polyamorous relationship formations meant relying on their memory in addition to their personal calendar and text message data. The relationship timelines that are represented, through three-dimensional pipe cleaners and two-dimensional digital drawing tools, are encoded with personal data and impressionistic meaning. At the end of the first interview, Bo had made not just one but two representations of their polyamorous relationships over time.

> Bo: *"Yeah, I went with* two *different representations. This one kind of represents the throuple that I was briefly involved with myself being the purple. It was kind of very brief and intense, as demonstrated by the kind of bunched-up-ness. And I know they continued in relationship after we separated and now we're not in a relationship with each other."*

Bo's first pipe cleaner representation of their relationships focused on a past, intense experience of a throuple (a relationship formation like a couple, but with three people) leading up to a present state of separation. This representation was a reflection of their past relationships. Bo represented the relationship, separation, and continuity of the relationship for two of their now-former polyamorous partners. While their first representation was focused heavily in reflection on memories from the past, their second representation was focused entirely on the future:

> Bo: *"And then this is more of a hope for the future. There's this couple that I'm friends with. And they're non monogamous that I would love to have a*

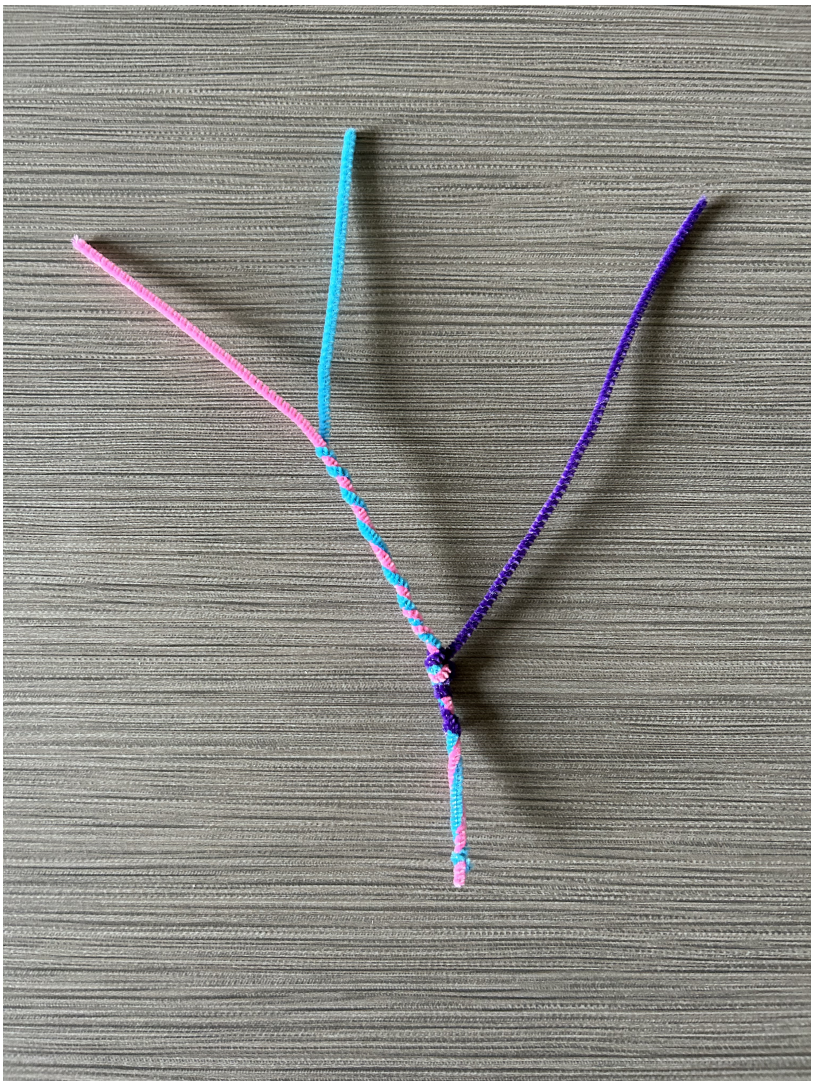

Figure 4.8: Bo's representation of their experience of a throuple.

> *relationship with–not necessarily like a consistent one. So again, myself as purple with maybe another partner kind of intermingled. That was more of like, I don't know, I'm a big fan of like, the community lumping of people who enjoy each other all together at once sort of thing without necessarily needing to have like separate boxes for everybody."*

Bo's second pipe cleaner representation was focused on speculation into a hopeful future of a polyamorous relationship with two other people. They emphasize that they are not hoping for a "consistent" relationship, but rather, an oscillating pattern with points of connection and disconnection. Their pipe cleaner representation of their speculative future relationship highlights the normativity of time and intimacy in relationships. While there are often assumptions that people must stay close over time. Bo describes and designs a model for understanding relationships as wave-like and undulating over time. They also describe viewing people in terms of community instead of viewing them as individuals. This is significant because it is a poly-inclusive way of conceptualizing relationship formations and the polyamorous community members that exist within polycules.

Towards the end of the first interview, Bo surfaced the following regarding technology design, heteronormativity, and mononormativity:

> Kinnee: *"My next question is: do you know of any technologies that are particularly heteronormative or mononormative?"*
>
> Bo: *"Everything?...I think the things that feel most prevalent are like dating apps are very mononormative or whatever. I mean, there's Feeld, which I think is probably my favorite dating app. Even then it's like, it was written very binary."*
>
> Kinnee: *"How's Feeld different from others?"*
>
> Bo: *"It feels designed for queer folx. And non-monogamous folx. So there's options to like connect–I think you can only connect with one partner though on*

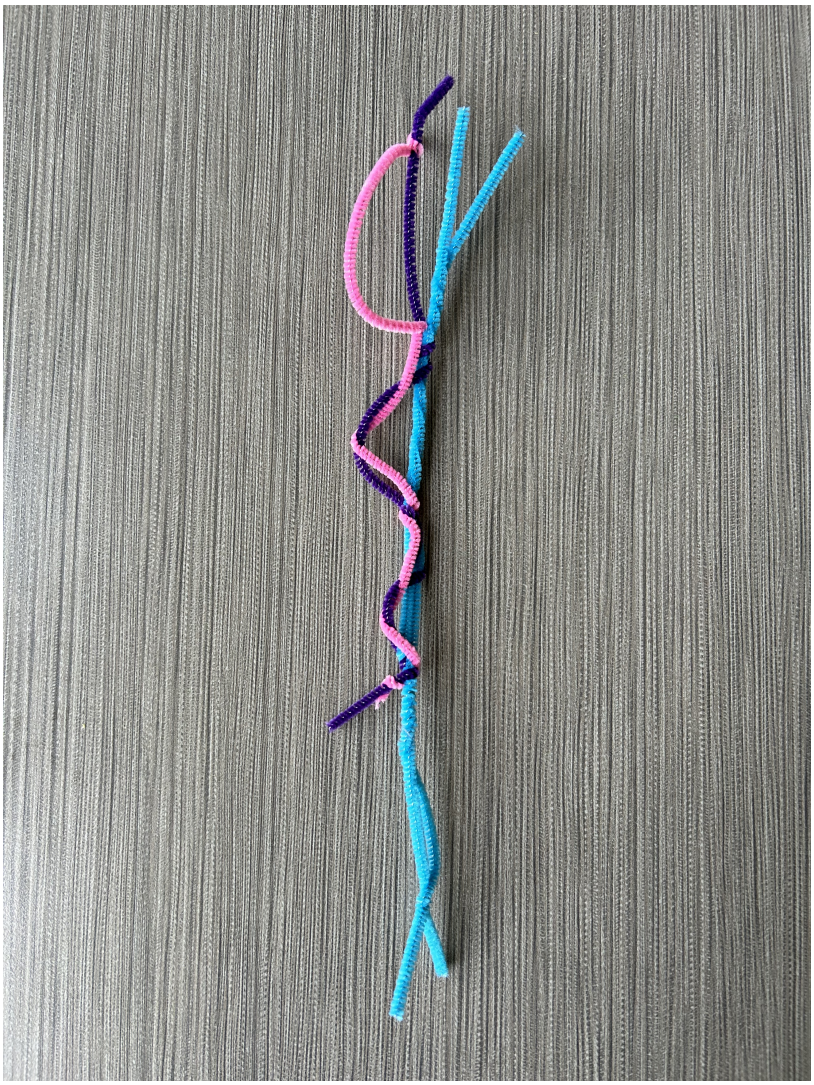

Figure 4.9: Bo's representation of "a hope for the future".

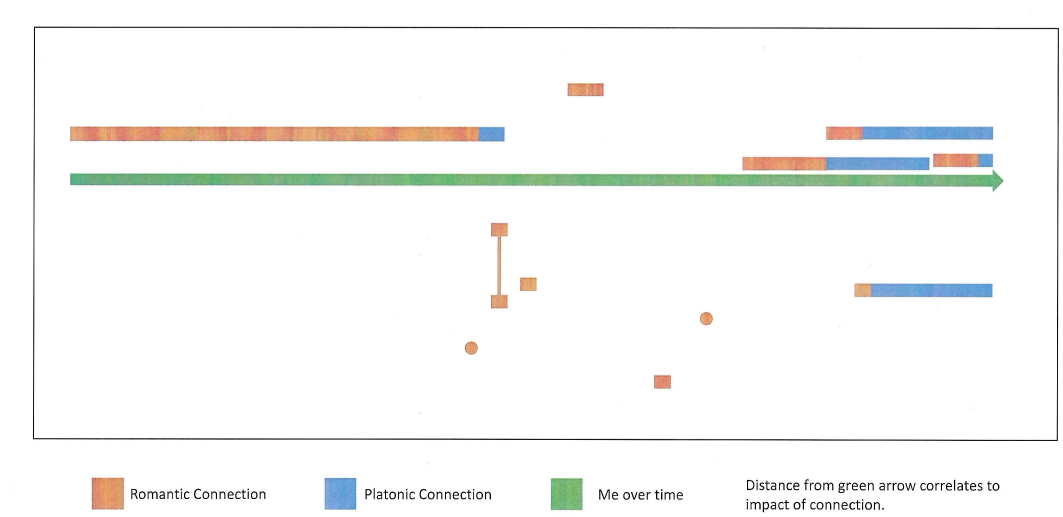

Figure 4.10: Bo's representation of their romantic and platonic connections over time.

> *there and like link your account to them. So even though it's kind of a mononormative primary relationship, but they have the most gender inclusive vocabulary and terms, and everybody out there is pretty direct about what they're looking for and what they want, what kind of person they are, which I appreciate."*

Bo descibes Feeld as a platform for queer and non-monogamous folx, while at the same time, Bo describes Feeld profiles as being limited to only one partner at a time. For Bo, Feeld is both a mononormative technology and a liberating technology. Multiple participants in the study mentioned the use of Feeld–often making similar observations about its design in terms of mononormativity and heteronormativity. In the example of Feeld, the technology is both well-suited and still imperfect for polyamorous people to represent themselves and their lifestyle as fully as possible. For Bo, Feeld is one of the best technologies available for polyamorous people because it has adopted and internalized the vocabularies of ethical non-monogamy that polyamorous people use to identify and maintain their relationships.

Crystal: On Queer Temporalities in Polyamory

Crystal identifies as a pansexual trans, queer person who uses he/they pronouns. In his autospeculations, Crystal portrayed past, present, and future configurations of their polyamorous relationships. To ground his autospeculations in personal data, Crystal used a combination of text messages, Google Calendar, Facebook Messenger, and Instagram. During the duration of the study, Crystal experienced a breakup with their then-primary partner.

In the first interview, Crystal described his relationship with his secondary partner:

> Crystal: *"I have a secondary partner who's just kind of like, you know, we see each other once a month, um hang out every month. Like it's not as...I don't want to say 'demanding', but it's not as...you know what I mean? It's just like a casual, casual thing, but there is still like... it's still a relationship."*

Crystal describes his relationship with his secondary partner as casual, meeting on a monthly basis in person. He describes how he is still in touch with his secondary partner during the time in-between visits, and how this fits his relationship as somebody who "need[s] a lot of space" and is "not a very touchy person". Crystal's current relationship with his secondary partner is also similar to Bo's representation of their ideal future relationship. This supports the notion that non-normative and/or queer temporalities are another feature of polyamorous relationships. When asked how they felt about their representations of their polyamorous relationships, Crystal responded:

> Crystal: *"I mean, to me it is I think it pretty much exactly is spot on to what has been occurring and what I would like to have happen. It was interesting to do, it was fun. It definitely had me thinking about how to best connect these, the pipe cleaners together to like, reflect that."*

Crystal describes a sense of validation in the design research activity. He says that the activity was "interesting", "fun", and emphasizes the degree of abstraction and translation in the act of representing one's relationships over time through pipe cleaners. While describing what

Figure 4.11: Crystal's representations of his past, present, and future relationships (back to front)

he had made, Crystal narrated their representation of their "now-ex-partner" and "a recent present":

> Crystal: *"Yes, this was a recent present with my now-ex-partner and I, where we were together but not seeing each other very often with the part I think this is what this is representing, like the distance there and then kind of coming together sometimes like on the weekend. And then it became a little bit more just us two living together in our own little monogamous thing until I opened the relationship up."*

Crystal depicts a polyamorous relationship formation in flux. He describes how his relationships have changed over time from monogamous to polyamorous. He also further describes the monthly cadence of their secondary partnership. Finally, he describes being the one who "opened [the] relationship up"–taking responsibility as the one who initiated the change from monogamy to polyamory. When asked what he was reminded of while making his representations of his polyamorous relationships, Crystal shared:

> Crystal: *"I, well at least with the past and present, like, reminded of just like what I had been through and kind of how I came to this...it could be a conclusion it could not be a conclusion, but like, right now, like, kind of validating being poly and and not settling for like a monogamous relationship and like kind of making that a part of my future."*

For Crystal, the design research activity of creating past, present, and future representations of his relationships gave him perspective. It reminded him of his past and how it has lead to his present. It also validated his sense of being polyamorous and his conscious choice of a polyamorous future. Crystal's reflections and speculations gave him a stronger understanding of where and when his relationships have been, are, and will be over time.

Finally, when asked about how which technologies they find to be the most heteronormative or mononormative, Crystal said "social media":

> Crystal: *"I mean, social media....I guess it just depends on...who you're following, but...I don't know how best to say...I think because there's a lot of catering to the monogamous just two-person couples that you do get most companies and most ads about that. And like even with Facebook, how you could add like your partner on there like just, you know, that one partner, just like that."*

Although he is aware of the mononormativity on social media, he still uses these technologies to navigate his relationships. Social media technologies produced some of the data that grounded Crystal's autospeculations (text messages, Google calendar, Facebook Messenger, Instagram). At the same time, Crystal used their personal data from these mononormative social media technologies to design representations of their past lived experiences, current experience, and alternative futures. Crystal's queer use of personal data from mononormative social media platforms foregrounds queer lived experiences and queer futuring through material elicitation.

T: On Polyamory and Memory

T identifies as a non-binary trans woman. She uses she/her pronouns and describes herself as "pansexual leaning sapphic". For her autospeculation, she used personal data from her Google Calendar to map her relationships around the occurrence of romantic dates over time. This allowed her to make a representation of her relationships with details such as when relationships started, ended, or trailed off. In the following passage, she describes how her representation of her polyamorous relationships is grounded in her personal calendar data:

> T: *"I made a chronological chart indicating a lot of my relationships over time. With the sort of rough distance indicating severity or closeness of relationship between a lot of those steps are indicative of like people I don't see very often. So I have people I'll see every once every six months, I used my Google Calendar data mostly to draw from this. Basically, I tracked my dates. So I just looked to*

my Google calendars, to check the name of the people I'm seeing, and saw how often I saw them and charted that on by frequency..."

Kinnee: *"That's awesome that you were able to ground it in your Google Calendar data."*

T: *"That's the only way I could have done anything. Otherwise, I literally forgot about people!....This is my own personal Google Calendar, which I have shared with a couple people so they can see it. And then I have one other Google calendar that is shared with my like, primary polycule, um, that I also use to track stuff, but I track my own dates on my personal calendar as well."*

T describes how her use of Google Calendar to manage her dates within their polycule allowed her to autospeculate about their relationships and design a representation of those relationships over time. Moreover, she also describes how she had forgotten about some people who are represented in her illustration. Therefore, through autospeculation grounded in personal data, T was able to recall memories of people who had become forgotten over time. She also described the activity as "fun" and "illuminating":

T: *"...it's fun to be able to track this because a lot of it, I didn't realize how much things changed for me at a specific point in time."*

For T, the exercise of autospeculation helped her to realize the dynamism of her relationships over time, but more specifically, at a particular, situated point in time. Finally, T describes the significance of the different lines and shapes in her illustration:

T: *"The circle shape is a hard dot or a hard end. And the dotted line is something where I just like stopped talking to someone or we just stopped conversing without it being like a hard breakup....So like, this one is somebody that I'm ostensibly like, we've never really broken up, and I do want to reach out to them lately. It's*

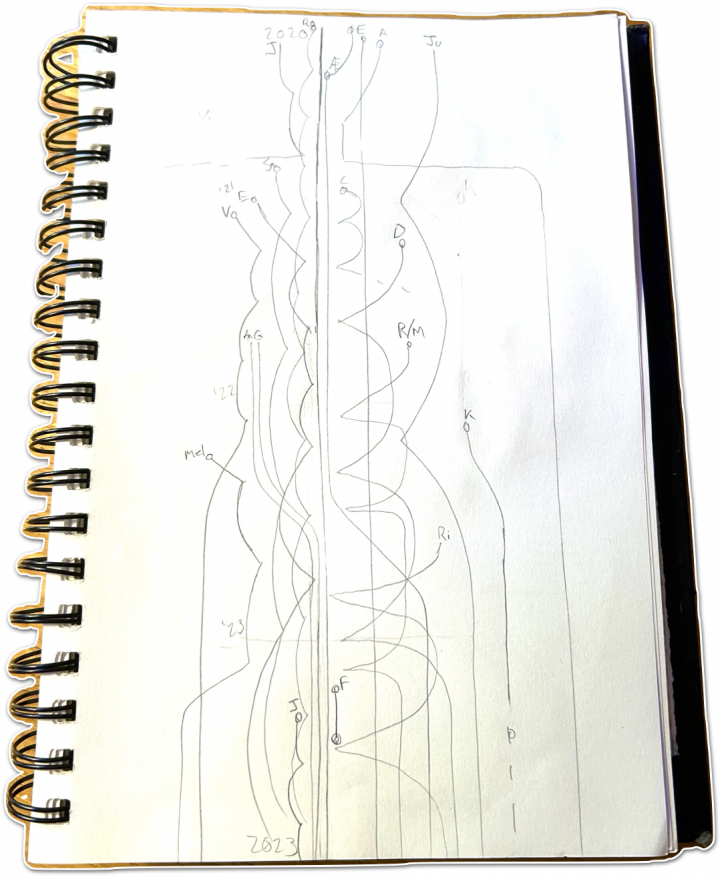

Figure 4.12: T's Illustration of her polyamorous relationships over time.

> *just been a while. And we both have a lot going on in life. Yeah. So like, I don't really know where we stand at the moment....straight lines are more stable...the center, bold line is indicative of me, and then all the ones that are close to it sort of show where the people are closer or farther....Whereas sort of bouncy ones are people who I might see once every couple months, every six months or so."*

Additionally, T described how the different letters indicate the names of her different partners over time. It is evident that T gained perspective about her polycule and her role within her polycule through autospeculation on her own terms and with her own personal data from her Google Calendars. What's more is that T also expressed uncertainty in her representation of their relationships. Using time and personal calendar data as materials, T told the stories of her multiple relationships over time, all at once, in a deeply entangled manner.

Sweet and Spice: On Polyamory as Lifestyle

Sweet and Spice are a married couple who conducted their interview and autospeculation-based design activities together. Sweet is a bisexual, cisgender man who uses he/him pronouns and identifies as a 1.5 or 2 on the Kinsey scale. Spice is a bisexual, cisgender woman who uses she/her pronouns and identifies as a 2 on the Kinsey scale. Their use of the Kinsey scale to self-identify their sexuality signals an understanding of sexuality as a fluid spectrum, as opposed to a series of rigid binaries. To ground their autospeculations in personal data, Sweet and Spice used a combination of Google Keep, Excel, Telegram, and Facebook Messenger.

Although Sweet and Spice signed up for the study and indicated that they were in or had been in a polyamorous relationship, they shared that they were not "out as poly":

> Sweet: *"that's kind of how we are like. Like, we've told some friends, but we've kind of stopped telling friends because we're not trying to bring them in to this world."*

Sweet's story depicts her lived experience of the stigma attached to polyamory. In order to create her pipe cleaner representations of her personal data, Sweet used Telegram and Facebook messenger data. When asked about mononormative or heteronormative technologies, she also shared her thoughts on mononormative technology development:

> Sweet: *"Oh, I looked at Telegram. I feel like that's where we had like group chats. I guess like Messenger things, too, but most of it ends up being telegram....If I had like how active I was on Telegram over time, maybe that would show it, but....Yeah, I think just like society's assumptions, it's like, I feel like the people who are making the apps aren't focused on like avoiding assumptions that they're making about everyone's lives. They're like, just focused on building the tech and like, getting it out there. And they're not like, 'oh, some people might have not just one spouse or one partner'. But like, they might need kind of sub-group chat, or things like that."*

Sweet's immediate response to this question was "Tinder". For Sweet, there is a clear association between their polyamory and their time on Telegram, and yet they believe this data to be unattainable. They unpack the ways in which technologies are often developed mononormatively and even describe a speculative technology of sub-group chats as an example of a technology that might arise from designing with polyamory.

Finally, in the follow-up interview, Sweet and Spice shared a series of representations of their polyamorous relationships. After the interview, Spice reached out to reiterate the meanings of each of the pipe cleaner representations:

> Spice: *"Yeah so the first one is what it is/was, the simple one in the middle is what we thought it would be like, and the last one is what we hoped it would be like."*

These models show the slight but consequential differences between living something, imagining something, and hoping for something. While they had imagined a tight coupling

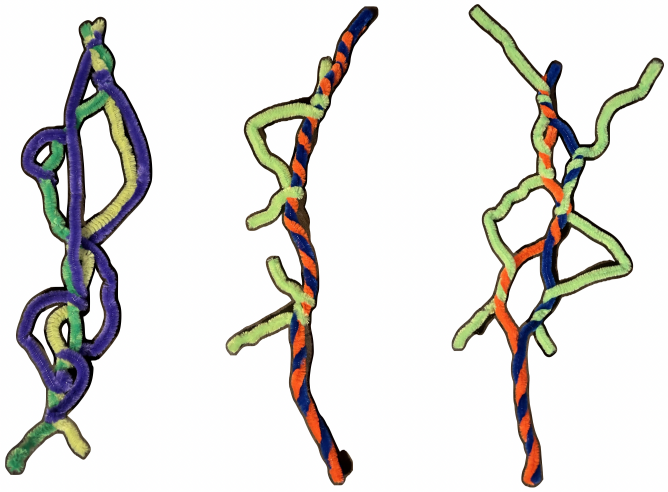

Figure 4.13: Sweet and Spice's pipe cleaner representations of their relationships. From left to right, they represent their relationships as they are, as they thought they would be, and how they had hoped for them to be.

between themselves with some occasional encounters with other individuals or couples, what they hoped for was a more symmetrical shape that alternates between tight and loose coils between themselves and other partners.

Diane: On Entanglements and Disentanglements

Diane is a gray ace, biromantic cisgender woman who uses she/her pronouns and describes herself as "straight passing". For her pipe cleaner representation of her polyamorous relationships, she focused on understanding her V-shaped relationship during a period of the pandemic from Winter of 2020 to 2021. A V-shaped relationship, or "V", is a relationship in which one person has two different partners who do not have a relationship with each other. Later, Diane produced three different illustrations using Excalidraw to represent her polyamorous relationships in terms of calendaring and polycules. At the end of the first interview, Diane described her pipe cleaner representation of her "V" relationship:

Diane: *"So I made this. This represents the 'V' relationship I was talking about.*

> *So the blue-I forgot which color and who-but the blue and red are my, my nesting partner and I and then the orange one is his girlfriend at the time, who I kind of was trying to figure out ways to like, it's not like we were all–it wasn't like I was disentangled from him, but it definitely shifted things. And so there's kind of like, a little bit of space. But still connection and still like living–being in concert because we were all, you know, physically in the house together and figured out how to how to live with each other. And then they broke up and she moved out and we're still together. I guess I don't need this to be entirely together because we haven't been together since the beginning of time....Yeah, so it was like a two-and-a-half, three-year period. "*

Diane's representation of her past V-shaped relationship attends to the changes in intimacy and closeness that she experienced over time. It physicallizes (Noortman, 2024; Thudt et al., 2018) entanglements and disentanglements between herself, her nesting partner (as in, a partner that one lives with), and her former metamour. In the initial interview, Diane described how designing for polyamory can potentially help other kinds of relationship formations as well:

> Diane: *"For non-normative families, that might be like two straight people living with an elderly family member or having teenage children or a blended family like there's–there's so many scenarios that products are not, like don't work for, which is wild!...But I was just like, there's so many other things. If people have a problem with polyamory, there's still so many other scenarios that this type of thinking benefits."*

Diane points out that designing for polyamorous relationship formations can potentially benefit other kinds of non-normative families. She expresses her discontent with domestic technologies for failing to address the needs of non-normative and non-nuclear families. This follows the universal design line of thinking wherein designing for one kind of user can benefit other, unexpected kinds of users.

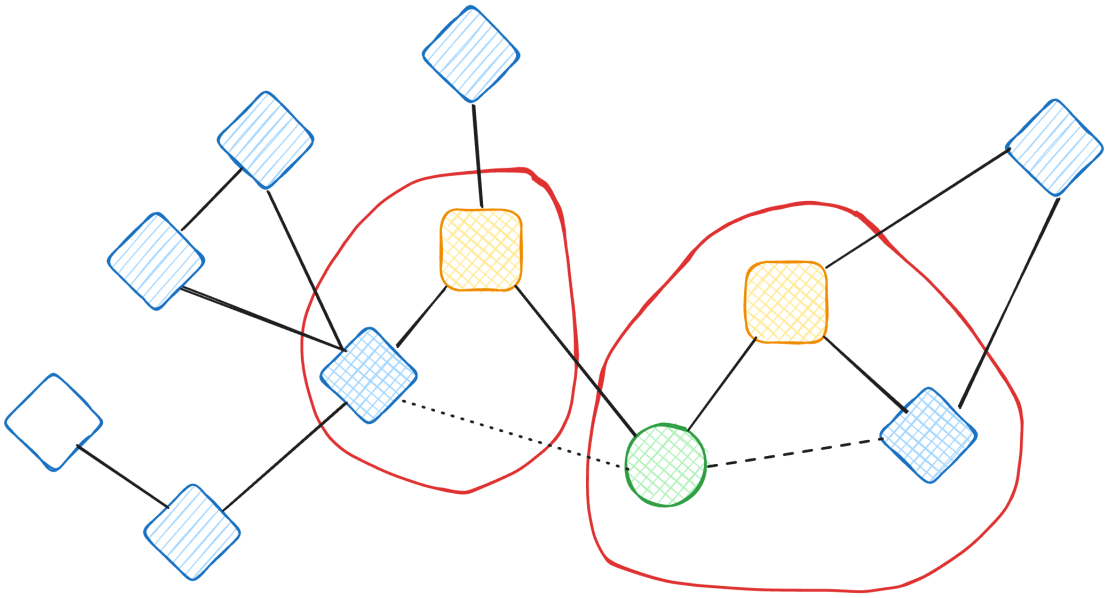

Figure 4.14: Diane's representation of her V-shaped polycule over the span of two-to-three years.

> Diane: *"Um, that was a good question. I think a lot of it is I think like, calendaring. I go through fits and spurts where I'm like, good about doing actual paper or paper journaling, but most of it exists in things like Google Calendar, texts...yeah, digital notes. Typically, if I'm trying to figure out like, 'where was I'? Or 'who, what, who went to those type of things'? I typically go to calendars. That's what's probably the main. The main point. Yeah. And text, I guess text to some extent, but they're kind of hard to search without, you know, actually putting them in some sort of useful database. But yeah, I think my my go-to is typically a digital calendar. To get a sense of like, 'what was what was going on?'"*

When asked about how she reflects, Diane also described using Google Calendar, "mostly because that's easiest," and said that when people learn that she's poly, they're expecting something "salacious" when the reality of polyamory is "live group calendaring". Additionally, Diane uses text messages and group text as a way of reflecting. She describes joking

with non-polyamorous people about the expectations versus realities of polyamory in terms of technology use:

> Diane: *"I use Google Calendar. Mostly just because that's easiest. I also typically joke with people about like, people who who aren't poly. When they're like, 'what's it like'? And it's like, you know, they're expecting some sort of like, salacious...yeah, it's mostly live group calendaring, and like group texts. Like, that's all that's, like, the vast majority of it is just figuring out who's attending what and where people are, and who's going to this barbecue or whatever. Which they're always like, 'oh...', like, yeah, it's not...at least, at least the polyamory I'm doing is not that like wild. Yeah."*

Diane's story highlights one of the ways in which polyamorous people are often hypersexualized and stereotyped by non-polyamorous people. She indicates that the truth of the matter, for her, is not as "wild" as non-polyamorous people might think. Rather, polyamory for her means using Google Calendar and group text messaging to plan, coordinate, communicate, and organize her time. Moreover, Diane's rendering of her polycule in terms of everyday calendaring reflects this notion: that her polyamorous lifestyle revolves around calendaring time for herself, with other partners one-on-one, and with multiple of her partners at the same time. Google Calendar and text messaging, for Diane, are the technologies that she relies on in order to communicate and plan with her polycule. Later in the first interview, Diane described how there's a heightened need for communication in polyamorous relationships:

> Diane: *"[Polyamory] definitely requires a lot of communication, that I think people aren't necessarily normally prepared to have. There's a lot of there's a lot of things that–there's a lot of things that you can't, or shouldn't assume that you shouldn't assume, in general, but especially shouldn't assume, if you're, you know, with multiple people, so I think it does force a certain amount of communication that people aren't necessarily used to....yeah, just keeping people up to date is like a whole thing."*

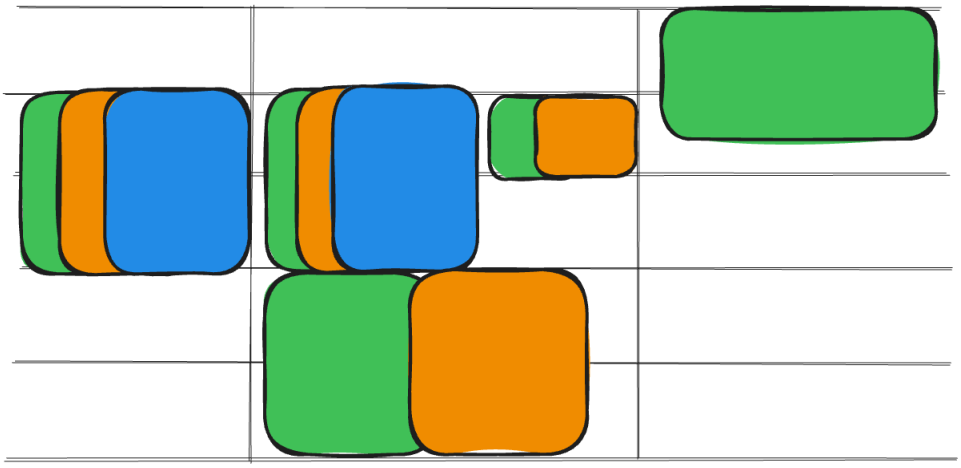

Figure 4.15: Diane's rendering of her polycule in terms of everyday calendaring.

Diane frames communication as the antithesis of assumption. The need to be a good communicator was echoed across the majority of participants. Polyamorous people, it seems, need to do a greater amount of communicating with their multiple partners because there are more people, more technologies, and more opportunities for assumptions to be made. As polyamorous people navigate this landscape, communication is key–and so are the technologies that facilitate communication (in this case, Google Calendars and text messages).

When asked about her sexuality, Diane shared that she identified as "straight passing". She also described how she identifies as disabled and chronically ill, which are related to her polyamory:

> Diane: *"A couple years ago, I would be like, I'm straight. I'm not straight. I don't know exactly where I am, but it's definitely somewhere–definitely somewhere on the ace spectrum. Which is also like, I'm also like, identify as disabled and chronically ill and like that is always tied up into that as well. That's just a complicated relationship."*

This quote from Diane highlights the many intersecting identities that can overlap with

polyamory. Disability and chronic illness can affect people's social and emotional lives in ways that might be often understated. Diane's recognition of the interconnectedness of these identities demonstrates an awareness of intersectionality–with polyamory being just one of several identities that she holds. Diane also elaborated on her polyamorous identity as independent of her current relationship status:

> Diane: *"Even if like tomorrow, heaven forbid, if like, my, my partner and I were to like, break up, I'm still going to be poly. Because I've figured out that that is, that is something that works for me. Even if I'm not like actively practicing, if that makes sense. I think it's had a very positive effect on my feelings about like, community and family and things like that, that I wouldn't have had otherwise."*

Polyamory is something that goes beyond Diane's current relationships. It's something that she has learned to incorporate into her lifestyle. In this case, "being poly" is more about one's orientation to relationships than it is about how many people one is dating at a time. She also describes how being polyamorous has encouraged her to see things like family (such as chosen family) and community in a different light. Being polyamorous is a different orientation to intimacy and the ways that we can experience it with more than one other person.

Charjabug: On Relationships, Identity, and Change over Time

Charjabug is a pansexual, cisgender female who uses she/her pronouns. In order to ground her autospeculations in personal data, Charjabug used her Google Calendar and notes that she had created about each of her partners in Notion. Her pipe cleaner representation of her relationships takes a unique approach that differs from the rest of what participants had made: she tightly coiled the pipe cleaners at the vertices of a zig-zag shape to represent her passage through relationships over time.

> Charjabug: *"Yeah. Um, so I would say like, this is the green line is me. My favorite color is green. So that's why I chose it. I tried to make it like a little*

Figure 4.16: Diane's representation of her V-shaped relationship while co-habitating.

> *bit more frayed, but I can't like, like, but each time I go through a relationship, like just running out of energy, y'know? This is a couple, you know, a blue and a black, I guess, cis, male-female couple. And then this is like a monogamous person? Who was kind of I guess distant...you know, because they don't feel the same way I do. Maybe? Or like, yeah, this is a male-male couple that I met on Feeld. And then, and then I continued a relationship with one of them briefly. And then this is the monogamous partner that we've now separated with. We really liked each other and wants to get married and have kids and everything!...And I would say like, there's not enough pipe cleaners, like I had a lot of experience with a lot of different people."*

Charjabug relayed part of her relationship history through representing relationships as energy-depleting over time. Relationships take energy. Her passage through the different relationships is also color-coded in terms of interactions with "male" or "female" individuals and couples. She expressed that nine pipe cleaners were not enough to fully represent her relationships, as she has experienced relationships with many different people. Charjabug

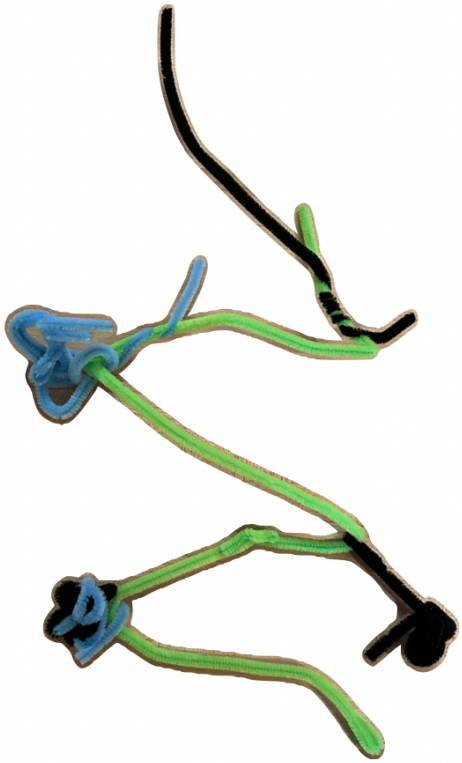

Figure 4.17: Charjabug's pipecleaner representations of her polyamorous relationships over time.

also described a fluidity between monogamy and polyamory that differs from the typical binarism surrounding these terms:

> Charjabug: *"I realized that like, yeah, like my, I like, even though I'm polyamorous I can also like, be flexible between like, monogamy and polyamory...it doesn't have to be one rigid style."*

Charjabug expressed more of an openness to monogamy than other participants, and seemed to understand herself as moving between polyamory and monogamy over time. Later, Charjabug described herself as a "relationship anarchist,".

> Charjabug: *"I was going on, like, one to three dates a day every day for a couple months. I got pretty burnt out...Yeah. So, yeah. And then I would describe, I guess, like, my style was like, relationship anarchist. Although, like, I don't know if I like really love the term because it felt like I'm trying to, like, revolutionize something. I'm just trying to be myself. You know, I'm not trying to, like, convert anyone or....it would vary a lot from how many partners I would have, like, any single point in my life, you know? Yeah, like, it could be like, as low as like, three partners to like, all the way to like eight partners, you know".*

According to Jessica Fern's *Polysecure*, relationship anarchy is a type of CNM in which "Relationship anarchists seek to dismantle social hierarchies dictating how sexual and romantic relationships are prioritized over all other forms of love..."(Fern, 2020). Charjabug's identity as a relationship anarchist emphasizes the importance and value of the many different kinds of relationships people experience. She resists the dominant social norms and expectations of intimacy exclusively existing between romantic and/or sexual partners. Moreover, she describes having as few as three and as many as eight partners at any given moment. With many partners to keep track of, Charjabug described using Notion to take and keep notes on each of her partners. When asked what she was reminded of when she did the design research activity, she recalled a somewhat similar activity that she had recently done:

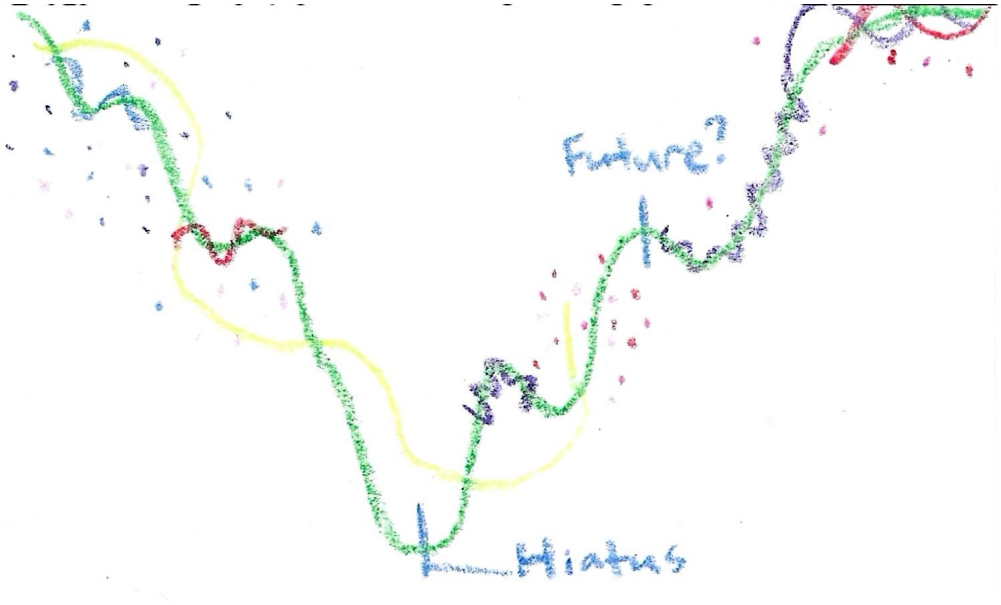

Figure 4.18: Charjabug's representation of her polyamorous relationships in the past, present, and future.

> Charjabug: *"Oh, like, what it reminds me of: I recently did like a, I guess, like dating wrapped 2023 with like, my cousins and siblings, you know, like, where I go over like, this is like my dating throughout the year."*

Charjabug had recently completed a similar reflection-based activity wherein she tallied and recollected all of her past relationships from 2023. She described her and her friends giving brief PowerPoint presentations to one another about their 2023 relationship histories. This activity signals a kind of curiosity, play, and engagements with personal data about relationships that our study had aimed to facilitate or remind people of.

After the first interview, Charjabug created a colored pencil illustration of her experience of polyamory over time. She uses her illustration to further demonstrate a flexibility between monogamy and polyamory, relationship anarchy and a "monogamish" lifestyle:

> Charjabug: *"Okay, so this is like a, I guess a graph, the y axis is like, I would say, I guess maybe my satisfaction with the relationship, the x axis is time, although*

> *it's not super like to scale or anything. So the green line represents me. And as you can see there, lots of ups and downs....This is like, I guess my ideal future. I would like, you know, like a family with someone probably. I guess it would probably be more of like a monogamish style rather than like, I guess relationship anarchy, which I've been doing so far. And then after, I guess, the kids are grown up whatever. I would like to be I guess more like polyamorous again. Probably, I guess relationship anarchy...."*

Charjabug described how she had an initial polyamorous relationship, followed by a period of burn-out, and then a six-month hiatus. A "monogamish" lifestyle, according to (Fern, 2020), "refers to couples who are mostly sexually and emotionally exclusive...". Charjabug imagined a future wherein they can have higher levels of emotional and sexual exclusivity, but with some occasional exceptions. Later, Charjabug described how she used her Google Calendar to create her representations of her relationships:

> Charjabug: *"Yeah, I would, like I guess count up the dates I had, you know, like, yeah, just go through my each month and count like what kind of dates were like single dates versus multiple repeat dates. And then I would also use I guess, like, I use notion for note taking. So I take notes on all of the partners I see. So right away, I could like kind of go back and like read and like also come up with a summary."*

Charjabug's process of autospeculation was grounded in her personal data from Google Calendar and Notion. She describes taking notes on each of her partners over time. Combined with Google Calendar data, she was able to reconstruct and re-represent her relationships in colored pencil.

After the second interview, Charjagbug followed up with First Author via email in response to a question about the mononormativity of technologies:

> Charjabug: *"I think Feeld has a nice feature now where you can link multiple*

> *different profiles to yours if you have a polycule (not that I've used this feature before, and it probably wouldn't be applicable to what I'm looking for from polyamory), but I would say they could be more polyamory-friendly by introducing a lifetime premium membership instead of a subscription model. A lot of dating apps have a subscription model for premium features, and the only one I use that has a lifetime membership is Bumble (surprisingly, since they don't really seem to have any features otherwise that cater to a poly audience), which I think is great because I don't ever plan on wanting to stop dating and meeting people that way. I think a lot of marketing for dating apps mentions how easily they allow you to find 'the one' and then to delete the app as quickly as possible, but that's not my goal, and I suppose that kind of marketing and subscription model can be considered mononormative."*

According to our research on Feeld's support forums (Support, 2023), there is still no such feature for linking one's profile to multiple accounts. Instead, Feeld tells users to "use the About section of your profile to explain that you have other partners". Feeld wants polyamorous people to change how they use their technology in lieu of designing their platform in a way that allows for polyamorous use cases. This example illustrates how polyamorous people are forced by design to change their behaviors instead of designing for polyamory. Regardless, Charjabug shared an interesting idea of a lifetime subscription model for dating apps like Feeld. Citing Bumble, which offers a lifetime subscription model, Charjabug stated that she doesn't ever want to stop dating and meeting people through Bumble. She expressed some surprise in Bumble's choice to offer a lifetime subscription, since she saw this as a decision that benefits polyamorous people, and yet, Bumble does not seem to have any otherwise poly-inclusive features. In this way, polyamory is an understanding and recognition of dating and relationship building as ongoing processes. She also unpacks how her goal in using dating apps like Feeld and Bumble is different than their typical, imagined user. Charjabug sees mononormativity in the same dating app that she uses to facilitate her relationship

anarchy.

4.4.2 Four Concepts of Relational Movement

Now that we have seen the specific contours of each participant's response to our material elicitations, we turn to what drew them together. Across the engagements, we observed four emergent ideas of relational movement: relationship timelines (temporal), relationship intensities (affective), relationship futures (imaginative), and relationship dynamism (degrees of change). With each of these facets, we see how tools for supporting autospeculation may or may not support the range of shifting connections that participants expect, notice, or desire. For instance, what makes a technology mononormative? This was a question that came up across almost each participant response. For some, such as Bo, a technology becomes mononoromative when it fails to provide options for people to self-identify and represent themselves as polyamorous. For others, like Crystal, mononormativity exists in the social scripts for relationships that platforms such as Facebook and Instagram regularly portray. Additionally, in each participant reflection there was also the choice of which personal data to use to autospeculate. Many participants chose to use calendar data to ground their autospeculations, as well as messaging tools and in some cases journals. Some of these are new technologies while others are very old. For example, calendars as a technology pre-date monogamy's current regime. We've had calendars as a technology longer than we have had monogamy as a dominant relationship structure. The fact that participants chose to draw upon data streams from both old and new technologies. In my study, participants drew on a range of everyday technologies and their data in order to ground their autospeculations. While polyamorous people remain stigmatized, this signals an ordinariness to their data practices that designers and technologists should consider. Polycules and chosen families use a wide variety of everyday life and domestic technologies.

Relationship Timelines

Participants represented their polyamorous relationships as non-linear timelines. They used the pipe cleaners to show relationships over time and at particular moments in time. This allowed them to make comparisons between before, during, and after changes in their relationships over time. For instance, Crystal represented his relationship before, during, and after a breakup. Similarly, Charjabug illustrated a six-month hiatus from dating in colored pencil (Figure 4.18). Other participants, like Schedule C-EZ and T, correlated their pipe cleaner elicitations (Figure 4.5) with specific dates and personal data from technologies such as Facebook and Google Calendar, respectively. Still others, like Nat, had more abstract representations of time as a distance from a central dot or representing themselves (Figure 4.6). Bo and Crystal both described a desire for relationships that involve seeing partners on occasion. These timelines extend the temporalities of relationships by allowing for more diversity of time and pace in relationships.

Relationship Intensities

Relation intensities refers to the kinds of relationship compactness and elasticity people described, often falling along a range of tightly coiled to loosely coiled. Participants used the craft kits to express feeling close to another person at one moment and then reshape the model to express how those proximities shifted over time, illustrating how they grew apart. For instance, in Bo's representation of their relationships over time (Figures 4.8 and 4.9), the distance from the green arrow, representing themself, correlates to the impact of the connection. Likewise, Gabriel's pipe cleaner model (Figure 4.2) depicts himself and his partner tightly coiled and coupled together, while the occasional other partner is represented as loosely looping through the central axes. In this vein, Schedule C-EZ's representation of their relationships (Figure 4.5) includes tight coils and large loops to show different levels of closeness and intimacy over time. This pattern can also be seen in Crystal's representations of his past, present, and future relationships (Figure 4.11), in which they represent their

past, monogamous relationship as tightly coiled, their present polyamorous relationships as slightly more loosely coiled, and their future polyamorous relationships as the most loosely interconnected. Similarly, T used different lines and shapes in her illustration to indicate different kinds of relationship endings, stability, and frequency (Figure 4.12).

Relationship Futures

Autospeculation about polyamory resulted in models and/or projections of what relationships might be, might look like, how relationships could be, and how people had hoped for their relationships to be. For example in Bo's representation of "a hope for the future" (Figure 4.9), Bo imagined what they had hoped their relationships to become. Additionally, Sweet and Spice created pipe cleaner representations of how they had hoped for their relationships to be. Crystal describes "making [polyamory] a part of his future" as an ongoing process of commitment.

Relationship Dynamism

People's relationships were live, changing in real time during the study. As mentioned, at least one participant, Crystal, went through a breakup during the time of the study. Our study design could not have controlled for the occurrence of such instances of relationship progression. Relationships are not static; we need new ways of talking about their intensities and timelines. Nat described how, through reflection, the material elicitation activity made her feel more aware of how relationships begin and end (Figure 4.7). Meanwhile, Diane speculated about how if they were to experience a breakup, they would still identify as polyamorous.

4.5 Discussion

Probing and Interviewing Couples

In the growing literature on design probes and design research interviews, scholars have overwhelmingly framed the research engagement as a two-sided exchange: an interviewer (design researcher) meets an interviewee (participant). While my study initially followed this pattern, I quickly learned to question the rigidity of the format. I first noticed that each person with whom I spoke brought a dynamic set of relationships to our conversations, animating connections that took their probe activities along new paths.

I further found that even as my recruitment method largely led to one-on-one conversations, I still needed additional space. One of our sessions, with Sweet and Spice, involved me as the interviewer and Sweet and Spice both as interviewees. This meant that the interview took a longer duration of time, and that Sweet and Spice could comment on each others' responses–often filling in gaps or reminding one another in ways that changed their responses. What would it mean for design research interviews to take place between many interviewees? How might this format invite a more polyvocal mode of storytelling, reflection, and speculation?

In asking these questions with the topic of polyamory, I invite design scholars to experiment with the tension between dialogue (conversation) and dyadic exchange (a conversation in two parts). Although many existing research methods (listening circles, focus groups, participatory workshops) open space for polyvocality, I find the particular intimacy associated with a design research interview to be a useful starting point for interrogating methodological mononormativity. I see an opportunity to use that interview format–a setting wherein design research participants expect a certain degree of connection, rapport, and intimacy—as a place for challenging the idea that intimacy must come from dyadic exchange. For the topic of polyamory, the importance of interviewing more than one person at a time may seem obvious; however, we did not have the opportunity, through our survey respondents, to interview more than two people at a time. It takes more than intuition to overcome

mononormative assumptions baked into interview protocols and the like. My study suggests the need for a more robust program for supporting polyvocal intimacy with design research.

4.5.1 Relationshapes

Although I have used many different terms to refer to the pipe cleaner-based material elicitations that my participants engaged with, the term that I have chosen to describe the final form of these relationship shapes is *relationshapes*. Building on queer phenomenology and queer theories of space and worldbuilding (Ahmed, 2020), relationshapes are tactile representations of relationships as they take shape over time, grounded in personal data. I believe that the framework of *relationshapes* holds the potential to be applied to a wide variety of materials and interpersonal relationships. Relationshapes are encoded with the personal data and stories of the people who design them–allowing for them to be readily shared as artifacts of design research without disclosing any personal or personally identifying information. Each relationshape must be decoded by the person or people who made it in order to fully understand its value, story, meaning, and representation.

4.5.2 Toward Emotion-Informed Design Research

One of our guiding principles for this work was approaching our design research interviews as conversations. Rather than treating our interlocutors as anonymous research subjects, or their answers as data to extract and aggregate, we took care to attend to their curiosities, hopes, needs, and emotional touch points. This involved slowing down the conversations when necessary and giving them the space to consider the multiple effects of material elicitation. As part of this paced reflection, while going through the activity, our interlocutors sometimes remembered people and relationships they had not previously articulated–to themselves or others. Other times they shared recollections of buried moments such as challenged faced during the early pandemic, noting how it can be difficult to remember some experiences from that period, especially when they were not all positive. For example, Schedule C-EZ asked me if they could bring their pipe cleaner representation of their polyamorous

relationships to their therapy session. Gabriel additionally mentioned that he could imagine a therapist doing our design research activity (representing polyamorous relationships through pipe cleaners with polycules) in a group therapy setting. Going through their personal data became a site for self-learning and self-care, sometimes offering one of the first opportunities for processing a relationship or related experience.

In this processing, we see how the study approach—material elicitation coupled with interviews—could feel like self-therapy. While going through the activity ourselves, I even remembered people I myself had overlooked in my own previous autospeculative reflections. This insight builds on recent research that has examined the psychotherapeutic benefits of qualitative design research interviews (Hirsch, 2020) and art therapy (Lazar et al., 2018). Hirsch, for example, traces some of the therapeutic effects of semi-structured qualitative design research interviews, while also calling for further evidence for the therapeutic effects of design research activities. Accordingly, my work illustrates the potential for those therapeutic effects to grow from qualitative design research interviews *as well as* design research activities.

In exploring this potential, my study suggests design scholars consider what it means for design research activities to have a therapeutic tenor, and how this might shape our understandings of design research practice. Should design activities shift in order to support certain kinds of internal processing? If so, how? As design scholars, we are rarely trained therapists or self-care professionals; instead we come to the research setting as interviewers. While we might not think of ourselves as offering psychic or affective support, we are often facilitating an activity that is highly emotional for people. This act of connection, interlaced with material reflection, urges further scaffolding and support. It suggests that design scholars consider the ethical boundary between design activity and therapeutic potential. Where should we, as design researchers, draw the line?

While lines can sometimes be drawn by the organizations that support design scholarship—for example, institutional review boards that require reporting particular research conditions such as the disclosure of self harm—material elicitations and other design research activities largely unfold without clear guidance on how to support participants and ourselves with

appropriate care. As we observed through the comments and reflections of our interlocutors, design research activities often evoke charged responses, suggesting the need for cultivating guidelines for emotion-informed design research.

What it means to do emotion-centered design is tied up in a host of considerations around trust, consent, and mutuality—what design scholars have called "emotion work" (Balaam et al., 2019). Within these settings, our work suggests that emotion-informed approaches entail sitting with discomfort, but also attuning ourselves, as analysts, to what it means to affect and be affecting in the role of researcher. We are each moving and feeling moved by one another, often in unexpected ways, as we saw when T remembered a relationship they had forgotten to account for in her own reflexive journaling and autospeculations. These movements involve reformulating and accounting for what it means to build trust and mutual care within a deeply consensual framework of understanding. They also call for learning from aspects of poly community around the development of clear expectations, agreements, and vocabulary for these reciprocal and consentful terms. As design scholars continue to engage with intimate and inner selves, these consentful programs become increasingly important to evolve and maintain.

4.6 Conclusion

In this chapter, I traced the deployment of a craft-based toolkit for making polyamorous relationships visible. I discussed how ten participants used the zine, pipe cleaners from the toolkit, and their own personal datasets to both reflect on and represent their polyamorous relationships. In closing, I highlight the need to consider how these kinds of elicitation toolkits are used within the interviewer-interviewee relationship as central to the success of this kind of work. I hope that this work surfaces conversations about normativity in design and the ways in which non-normative relationships and identities intersect with design research methods and practice. I also hope that this work highlights the diversity that exists within polyamorous communities, as well as particular considerations that might be taken into account when designing for polyamory. In order to design in less mononormative ways,

we, as design and HCI scholars, must attune our research methods and toolkits to be more inclusive of alternative ways of loving and being loved.

Chapter 5

AUTOSPECULATION AND DESIGN FOR POLYAMORY

5.1 Introduction

With its longstanding commitment to scientific empiricism, the field of human-computer interaction (HCI) research has sometimes struggled to acknowledge that data analysis is both an emotional and speculative process [1]. Looking through data can feel invigorating and awe-inspiring, evoking feelings of hope and desire. But it can also feel like falling through ice—suddenly submerged, the wind knocked out of us, looking for a way to the surface. In this sense, as many scholars have noted (Cifor et al., 2019; Gordon, 2008; Loukissas, 2019), data analysis is always intimate, local, and embedded—a processing of discrete entities with and through particular forms of storage, circulation and usage, whether performed by a computer, analyst, or institution. Equally, analyzing data can inspire explorations of what has not been or what could be—alternative situations in the past, present, or future that reorganize design possibilities for the here and now. With data in our hands, we are not only learning about ourselves and the world, but also about the potential for it to be different.

But what does it mean for this process of data analysis to embrace its situated and speculative nature? What might it look like to consider data analysis a particular process of design, one that is not only critically grounded in a designer's own situation but also offers modes of imagining the world otherwise?

This chapter explores this potential by tracing our development of a blended process of speculative and autobiographical design, an approach I call autospeculation. By autospeculation, I refer to a process of closely analysing one's own practice that offers tools for imagining

[1] This chapter was written in collaboration with Audrey Desjardins and Daniela K. Rosner and was published in the ACM Conference on Human Factors in Computing Systems 2023 Kinnee et al., 2023

that situation otherwise. To chart this development, I revisit an autoethnographic design inquiry, which was featured in chapter 2, in which I [2] speculated with my voice assistant data archive during a period of personal relationship breakup (Kinnee et al., 2022). In this work, I examine how autospeculation scaffolds both data analysis and design—pointing to important considerations for positionality, slowness, and pause. This final chapter also expands on the insights from chapter 4, wherein autospeculation with others demonstrated the capacity for reflection and speculation with personal data at the community level in addition to the individual level. Functionally, this chapter aims to reflect on and close out the dissertation work that precedes it by tying each chapter together with the red thread of autospeculation as a design research technique for individual and community-level engagements with personal data.

My work builds on a range of speculative design and autobiographical design studies that have provided HCI scholars with frameworks for investigating what might be designed, and how users of a system might design the system to adapt to their own particular needs through self-usage (Aoki, 2007; Desjardins, Tomico, et al., 2021; D. K. Rosner, 2012; D. K. Rosner & Taylor, 2011). Prior examples of autobiographical design in HCI and design research include reflections on a naval tactical command system (Aoki, 2007), the long-term use of a personal electronic notebook (Erickson, 1996), living in prototypes (Desjardins & Ball, 2018; Desjardins & Wakkary, 2016), living 'together' in long distance relationships with telepresence robots in smart homes (Chien & Hassenzahl, 2020; Yang & Neustaedter, 2020), telling stories about difficult experiences through Design Memoirs (Devendorf et al., 2020), and the autobiographical design and use of objects with personal media to support ongoingness in bereavement (Wallace et al., 2020). Neustaedter and Sengers (Neustaedter & Sengers, 2012) define "autobiographical design" as research drawing on extensive, genuine usage by those creating or building the system. By 'genuine' usage they mean it is based

[2] In this chapter, as in chapter 2, I alternate between using first-person language and collective 'we'/'our' language in order to precisely portray the individual and collaborative nature aspects of our data analysis and the development of autospeculation.

on the true needs of the researchers, rather than them pretending or imagining to have needs expected of targeted users (a critique of empathy studies (Bennett & Rosner, 2019)). This work frames researcher or designer's own experiences as embodied in the design of a system and its exploration. That is, as the researcher(s) build the system, they use it themselves, learn about the design space, and evaluate and iterate the design based on their own experiences (Neustaedter & Sengers, 2012, p. 514).

In this chapter, I reflect on the ways autobiographical design and autospeculation allowed me to reimagine data practices and navigate important critiques of speculative design. To ground my analysis, I start with background works from scholars who have carefully pointed at the drawbacks of speculative design (e.g. Kiem, 2013; Prado and Oliveira, 2015). I also offer theoretical groundings for autobiographical design and its current intersections with HCI speculative design and design research. My analysis focuses on four main reorientations through autospeculation: taking from within, hyperlocal speculation, committing to slowness and depth, and near-past intimacies. Weaving across these threads, I point to two generative tensions for future work: risks of revisiting and polyvocality.

Our introduction of autospeculation offers two main contributions to HCI literature on design and data analysis. First, I expand a growing set of methods for critically analyzing data (e.g. self-tracking, reflective design, autobiographical design (Agre, 1997; Neff & Nafus, 2016; Wallace et al., 2020)) by using speculative encounters to inspire new forms of creative engagement with personal data. Second, I advance conversations on speculative design methods and their risks by integrating first-person approaches that deepen and enrich people's intimate relationships to data practices. This deepened intimacy highlights the forms of emotional labor, affective positioning, and uneven power dynamics wrapped up with personal data, illustrating the risks of highlighting an already-dominant perspective.

5.2 Background

5.2.1 Speculation

Speculative design has a long tradition of asking questions about the process of futuring — both in terms of how futures get imagined and the stakes of those interventions. While some projects seek to spark critique and introspection others focus on world-building and reinvention, showing what a life might be like within a particular set of near-future conditions. In their work Invocation for Hope for the 2021 Vienna Biennale (Superflux, 2021), for example, design team Superflux exhibits a room lined with dead trees that surround a patch of green: a "resurgent forest born from the ashes of humanity's hubris." In the green space, visitors immerse themselves in the gray rocks and listen to traces of terraforming and destruction—entangling imminent damage with the beauty of resurgence.

An important body of work has tried to hold speculative projects to account by pointing to the under-examined ethical and geopolitical contexts of such work (J. Bardzell & Bardzell, 2013; de O. Martins & de Oliveira, 2016; de Oliveira & de O Martins, 2014; Pierce, 2021). Where Jeffrey and Shaowen Bardzell have pointed to the situated ethical perspectives revealed through speculative critical traditions (J. Bardzell & Bardzell, 2013), Carl DiSalvo notes how speculative projects "may stop at the discovery and articulation of the issue"(DiSalvo, 2009, p. 60). Beyond HCI, scholars have called on speculative designers to recognize the overwhelmingly white American-European audience intended for their work and the need for infusing speculative projects with concerns for positionality, power, and historicity (de O. Martins & de Oliveira, 2016; de Oliveira & de O Martins, 2014; Kiem, 2013; Tonkinwise, 2014). In their widely influential "Cheat Sheet for a Non- (or Less-) Colonialist Speculative Design," for example, Luisa Prado and Pedro Oliveira (de Oliveira & de O Martins, 2014) call out the imperial and colonial roots of much speculative design futuring, prompting designers to ask: "does my dystopia happen already in other 'invisible' (sic) places of the World?" In a list covering topics of elitism and bias, they begin their fourth bullet with a question of appropriation: "Is my scenario/story/object somewhere else's local

aspect/culture, appropriated as to fit my own?" A possible answer follows the question: "If yes," they write, "please refer to point 2 and check if your culture/country did not already do that a few years ago by the use of violence and other less friendly means." (Point 2 asks if a described dystopia is already happening outside the designer's purview). Prado and Oliveira end their fourth bullet with a link to a Jezebel article on cultural appropriation (Baker, 2012), adding: "Yes, it is a very controversial topic and there is no consensus about it. Yes, you have to read it anyway." Humor aside, their assertion brings certain clarity to critiques of privilege: when white Northern European middle-class designers try to shock their audiences with dangers associated with emerging technology, their stories tend to rely on and reproduce a privileged worldview while erasing the experiences of those already experiencing the so-called dangers. With observations like these, critiques call for prominent speculative designers to take a political stance on technological development projects rather than what can feel like endless politically amorphous gestures at potential conditions.

Extending this critique, design scholars such as Tonkinwise (Tonkinwise, 2014, p. 169) have expressed criticism of the "shopping" framework and taste regime underlining particular speculative arguments and visions. In his review of Speculative Everything (Dunne & Raby, 2024), Tonkinwise (Tonkinwise, 2014) provides a critical reading of the assumptions and leanings baked into Dunne and Raby's landmark contribution to speculative design methods and practices. Among other things, Tonkinwise critiques the fastness of DnR's speculative design process through long-refuted logics of scientific accelerationism (Tonkinwise, 2014, p. 184). Quite plainly, Tonkinwise states that "...the basis of the speculations by DnR always have technoscience at their center, rather than altered social relations" (Tonkinwise, 2014, p. 17). He emphasizes that Dunne and Raby's argument for speculative design universe is motivated by an underlying warrant of capitalistic "future shopping" logics: "...agency to determine futures lies only in the hands of those with discretionary budgets to spend." With this in mind, Tonkinwise encourages designers and design researchers to instead future in ways that go beyond the logics and aesthetics of "the market" and technoscience. Furthermore, Tonkinwise points to the lack of engagement with themes of class despite an ongoing financial

crisis and their techno-solutionist vision of disability as "negotiated — as an opportunity for trans-humanist futures, for instance." Noting their use of "we," he assigns them what he calls "the first person plural," writing, "But it is disconcerting when, despite most uses of 'we' meaning 'we, [Dunne and Raby],' many of them are there to invoke humanity in general" (Tonkinwise, 2014, p. 171).

Other critics consider how speculative design was always meant for spectatorship, in the showroom, rather than participation (Farias et al., 2022). In response, some approaches like material speculation (Wakkary et al., 2016), speculative enactments (Elsden et al., 2017), and experiential futures (Candy & Dunagan, 2017) emphasize speculation that happens directly within everyday life, where there is friction between a counterfactual artifact and the 'real world'. In many cases, these speculations also invite for longer term deployments of the artifacts—in contrast with the more controlled, shorter-term research engagements which place a premium on understanding 'the interaction' as a singular event between a user and a technology. Some recent examples of long deployments include Table-Non-Table (Hauser et al., 2018), Tilting Bowl (Wakkary et al., 2022), and the Photobox (Odom et al., 2014).

While long deployments might still involve the use of prompts to encourage people to think about or use technologies in particular ways (Elsden et al., 2017; H. Tan et al., 2022; Singhal et al., 2018), the temporalities of interaction are much more open-ended—allowing more time and space for people to process, interpret, and revisit their experiences of living with the technology in a recursive and discursive manner. In an effort to move away from analyzing interactions and towards analyzing relations (Wakkary et al., 2022), I revisit speculation to highlight its potential as a tool for committing to slowness and representing the particulars of people's lived experiences through longitudinal inquiries about social relations and personal data.

5.2.2 First-person research in HCI and design: Autoethnography and Autobiographical Design

Building from autospeculation as a first person method, I then created a method for engaging with others (as detailed in chapters 3 and 4). In this chapter, I examine how autobiographical design could serve as a method to respond to current critiques of speculative design, with a particular attention to its role during the data analysis process. I propose that autobiographical design has the capacity to ground and render more personal certain kinds of speculation, opening a space for diverse voices to emerge.

Inquiring into highly personal and intimate moments of human life, whether or not they are related to technology use, requires tactfulness, care and attention. One strategy used by HCI and design scholars interested in personal everyday experiences with technology has been to turn to first-person methods. In first person methods (Desjardins, Tomico, et al., 2021), including autobiographical design (Neustaedter & Sengers, 2012) and autoethnography (Ellis et al., 2011), as well as somaesthetic (Höök et al., 2018) and microphenomenology (Prpa et al., 2020), the researcher is positioned simultaneously as the participant (subject of the inquiry) and the researcher. In this position, the researcher can be more attuned to their own personal, bodily, and emotional experiences, phenomena difficult to express otherwise. While autobiographical design focuses on the experience of designing, building and living with a design artifact that responds to a designer's or researcher's genuine need (Neustaedter & Sengers, 2012), autoethnography emphasizes the first hand lived experience of a specific phenomenon.

In recent years, first-person research projects in HCI have forged important new directions gaining first-hand insight into the experience of those who are often underrepresented. For instance, works have offered new perspectives at the intersection of HCI, disability studies, and assistive technologies (Jain et al., 2019, 2020), while other works have offered new views on questions of gender, sexuality, and technology (Cifor & Garcia, 2020; Hedditch & Vyas, 2021; Kinnee et al., 2022; Spiel, 2021), as well as relations to the changing body,

through explorations of breastfeeding and menstrual tracking for instance (Helms, 2020, 2021; Homewood, 2018; Homewood et al., 2020).

Autoethnography emerged from the crisis of confidence in the social sciences in the 1980s (Ellis et al., 2011). In an effort to acknowledge the presence and subjectivity of the researcher, social sciences scholars developed autoethnography as a research and writing practice that would foreground personal experiences from within. Of particular interest to our project is Ellis, Adams and Boechner's account of the motivation for and the need for autoethnography, very similar to current critiques of speculative design. They write: "there was an increasing need to resist colonialist, sterile research impulses of authoritatively entering a culture, exploiting cultural members, and then recklessly leaving to write about the culture for monetary and/or professional gain, while disregarding relational ties to cultural members" (Ellis et al., 2011, p. 274).

Autobiographical design and autoethnography have already been combined with speculation and design explorations in projects such as *Watching Myself Watching Birds* (H. R. Biggs et al., 2021) where Heidi Biggs used video and audio remix as a strategy to dive deeper into their analysis of bird watching. Biggs et al. are clear about their use of design methods in parallel with autoethnography: "we position our sound and media experiments as an autoethnographic mode of self-exploration and expression through making; there is no intention to produce extensible design patterns or design portfolio-type pieces, for example." (H. R. Biggs et al., 2021, p. 5). Similarly, in *Entangled Reflections on Designing with Leaky Breastfeeding Bodies* (Helms, 2021), Karey Helms offers "autobiographical designs that share emotional memories and invite reflexive narrative". Central to the practice of autoethnography is the act of writing as a process for systematic analysis and for meaning making (Ellis et al., 2011). Like ethnographers, the autoethnographer aims at creating a "thick description" of a situation by using artful and carefully crafted writing. With autobiographical design, this process of meaning making also happens through the making of the artifact or system designed. The reporting on the lived experience in this case is embedded both in the artifact itself (the ultimate particular, as Stolterman expresses (Stolterman, 2008)), and in

the written form recounting the process of designing, making and living with.

While first-person research has high potential for diving deep into unique and genuine first-hand experiences, it isn't without challenges. Audrey Desjardins and Aubree Ball (Desjardins & Ball, 2018) articulate five tensions in autobiographical design, including the difficulty in managing intimacy, relationships and privacy for the researcher as well as whoever lives in their close periphery. Laura Devendorf, Kristina Andersen and Aisling Kelliher propose Design Memoirs: "as a way of "making about" emotional experiences that resonate within their maker" (Devendorf et al., 2020, p. 3). The authors present three cases of difficult personal stories that are rendered "addressable, shareable, and open for new interpretations" (Devendorf et al., 2020, p. 1) through the design memoirs. This work is highly important as it addresses the constant risk in first-person methods in the balance of disclosure vs privacy (also articulated in Jain et al., 2020): "This is a form of shareable autobiographical design that wants and indeed claims to be sincere, while all-the-while reflexively testing and probing the limits and constraints of that public claim." (Devendorf et al., 2020, p. 1). My work further focuses on the risk of engaging with one's own lived experiences in the moment in which it happens, but also in a mediated way, through data archives that may be visited and revisited days or months later.

5.3 Methodological Approach

Three registers of analytical work inform my current study: (1) solo analysis (initial data collection and reflection I conducted with my own voice assistant data; as presented in chapter 2); (2) autospeculation (the autoethnographic design inquiry that all collaborators—myself, Desjardins, and Rosner—conducted with my collected data); and (3) meta-analysis (our reflection on the autoethnographic process). By register, I refer to the particular range of interpretive work that we took up across this program of work; much like on a musical instrument, I use this term to emphasize how my relationship to data shifted across our study rather than settle at discrete levels, phases, or types of analysis. While drawing on different registers, this paper reports on our meta-analysis, a process of looking back on our

techniques of autospeculation in chatper 2, in the humanistic HCI tradition of close reading (S. Bardzell & Bardzell, 2015), exploring their relationship to more established approaches such as speculative and autobiographical design. Later on in this chapter, I also look back at chapters 3 and 4 to consider new insights about autospeculation based on inquiring and speculating at the community register. Below, I outline the first two registers of analytic work that informed this inquiry before diving into the third register of analysis in section 5.4.

My initial investigation produced an autoethnographic design inquiry of everyday experiences with the Amazon voice assistant Alexa over nine months in my queer household (Kinnee et al., 2022). We followed this long deployment of domestic devices with a series of ongoing exchanges and dialogues between the co-authors. These conversations informed the decision to design with the recordings through audio experiments to further make sense of the data, to speculate, and to analyze. In addition to first-person methods and autoethnography in HCI, in the initial reporting of this project (Kinnee et al., 2022), as shown in chapter 2, I provided an overview of ethical considerations and further described our sonic data collection, analyses, and experiments.

During the autoethnographic design inquiry, I had relationships with my partner of five years (Warlock) and with a boyfriend of roughly three months (Michael) (I am using pseudonyms for anonymity). I was in two concurrent, consensual, and separate relationships with both Warlock and Michael (Fern, 2020). This non-monogamous, queer relationship formation is often referred to as a "Vee" or a "V-shaped" relationship because one person interacts independently with two other people. Both Warlock and Michael consented to be a part of the polyamorous relationship formation, and both were aware that I was involved in separate, but concurrent relationships with both of them. The project first started with questions around the voice assistant's inability to differentiate between queer voices, and my feeling of being excluded by the design of voice assistant technologies. The project shifted when, a few months into the deployment, I experienced a breakup with Michael. At that point, new questions were surfaced as I lived through this breakup alongside a voice assis-

tant. The analysis process entailed looking through the Amazon Echo transcript and audio archive of Alexa in moments pre- and post- breakup, revealing insights about the interwoven themes of intimacy, queerness, temporality, and voice assistant technologies.

The analysis process included accessing and downloading the voice assistant's transcript and archiving it in a single column spreadsheet. As we, the research team, read through the archive, we used the commenting section to mark interactions that called for further examination. I often responded in the comments with more context about an interaction, or I would explain further during our weekly meetings. I then downloaded a series of audio files associated with the most interesting and intriguing interactions (not all of the audio files were downloaded because at the time of the study, Amazon didn't have an interface that allowed a bulk download, and each file needed to be downloaded manually). We all listened to the audio files and chose to remix them (with processes such as looping, reversing and layering) as a way to attune ourselves even more to the audio content and the qualities of the sound pieces. I see this full process as one where we speculated about ways in which data could be reclaimed by those who produce it. More details about our analytical process can be found in chapter 2 of this dissertation (Kinnee et al., 2022). This analytical process corresponds to registers 1 and 2 in our analytical work: it involved solo autoethnographic work on my part, as well as collaborative analytical and speculative work on the part of all researchers involved.

As I describe in more details below, the process of working with data that are sensitive and emotional was complex and needed to be handled with care. At the same time, in this first analytical pass, the writing process was also one of various ways I used to navigate and make sense of the breakup. As autoethnographers Ellis, Adams and Boechner state: "Writing is a way of knowing, a method of inquiry (Richardson, 2000). Consequently, writing personal stories can be therapeutic for authors as we write to make sense of ourselves and our experiences, purge our burdens" (Ellis et al., 2011, p. 280). In this chapter, I further complexify this statement by examining moments when the analysis may have felt therapeutic, and moments when it became too hurtful to revisit.

In this chapter, I offer autospeculation as a way to deepen our reflection on the methodological aspect of this project. Our collaborative process consisted of a reflective analysis grounded in weekly discussions between the co-authors. I relied on memory of both the data (transcripts and audio archive), the stories and anecdotes I recounted the first time I went through the data, as well as our broader experience of conducting this research. In addition, I conducted a close reading of recent and current critiques of speculative design to contrast our approach and ground our description of autospeculation. Similarly to our process for the original project (Kinnee et al., 2022), we used the writing process as a place to think through ideas together. Over time, we developed a practice of using the commenting function in our writing platforms (Google Docs, Microsoft Word, and Overleaf) as a safe place to share thoughts and try out new ideas. This proved incredibly helpful in the context of sharing first-person experiences because it allowed for a space that was one step removed from the more formal frame of the paper itself. This safe space felt easier to write in, especially when trying to express emotions or personal memories. In addition, we were able to respond to each other, often emphasizing a point or refining an argument, before moving to the main space of the text. Many of the comments' text were then moved to the core text.

5.4 Four Reorientations Through Autospeculation

Our study focuses on the techniques we used to reflect on my experiences using a voice assistant in my queer home during a breakup. Blending critical reflections with experiments on voice assistant data, I find that our approach urges a consideration of several important themes: the potential of taking from within our own data-streams, the significance of hyperlocal speculation, commitments to slowness and depth, and the intimacies involved in shifting from near-pasts to near-futures. Below I elaborate on each of these analytic aspects of our method and explore their implications for HCI scholarship on first-person methods and speculation.

5.4.1 Taking from Within

My encounters with speculation in this project reveal a certain tension around claims and ownership. First, it took significant work for me to manually download and access their voice assistant data, and to create the remixes all the research team used to attune and listen to the data. In each case, the engagement with data relied on a capacity to not only access it, but also use and manipulate it. Through a reworking of personal data, the speculation emphasizes the work of adopting something for one's own use without the explicit permission of the entities that control that data.

Whether deliberate or not, this act could be considered one of appropriation: shifting the locus of control from one body to another; in this case, from a corporate technology firm (Amazon, Google, etc) to an individual user (myself). The HCI field has had a long relationship with appropriation as a form of user-directed action and reuse. Since at least the early 2000s, scholars have used the term to denote forms of everyday action that users take to use designed artifacts in unexpected ways, beyond the designer's intent (Carroll et al., 2001; Dix, 2007; Dourish, 2003; Fischer & Giaccardi, 2006). Appropriation referred to 'the design after the design' reflects the kinds of usage I tried when I took my data back from Amazon Alexa for my own purposes, as opposed to what the data was originally meant to be and do. More recently, HCI scholarship on appropriation has considered its social and political dimensions, emphasizing the ways technology makes possible forms of cultural appropriation a practice whereby a person or group uses their position of power to take cultural materials (rituals, concepts, practices, etc) from a less powerful person or group. In contrast with the terms of technology appropriation (design after design) or cultural appropriation (claiming what is not one's to claim), the usage I encountered is contested: embedded in a particular dynamic of control residing within the technology firm. If Amazon had disallowed me from downloading my data, the act of appropriation would have been impossible. Yet the downloading process itself was neither easy nor smooth; instead, it involved tedious labor on my part. This effort required to review the data contrasts with

how other technology firms allow users to download data or not. Google, for example, has an interface that allows for the direct downloading of all data, while Apple prevents any downloading for voice assistant data (from what I have gathered) (Carey, 2022; Macpherson, 2022).

Rather than technology or cultural appropriation, I see a form of looking back at one's own legacies of practice and taking from within them. This activity resonates with a rich set of criticism emerging within speculative design scholarship over the past half decade, such as the "Cheat Sheet" (de Oliveira & de O Martins, 2014) I mentioned earlier. By pointing to a desire to shock audiences with as relying on a form of appropriation, they make important links between the political and speculative stakes of design, prompting designers to take a position on their own creations. Our own experiences of taking from within my data streams urges a complementary process of positioning. Taking back corporate data associated with queer home invites an acknowledgement of power relationships between users and their corporately held data.

5.4.2 Hyperlocal Speculation

Through this reflection, we learn that the specificity of our situations, and location and time in which we conducted our original analysis, invited us to take a position—implicating ourselves in the analytic process. While going through the data recordings, for example, I came across an audio file which captured a voice request, but also the voice of a newscaster in the background, talking about an event "south of Seattle". When we discussed this clip as a group during the analysis, I remembered the specific moment when I was listening to the news about a fire at a local LGBTQ+ bar with suspicion of arson. Here, conventional speculation would perhaps use such a detail as a punctuation, as something in the background to offer texture or a quirky, surprising, or almost unsettling 'sense of this new everyday'—similarly to how B-roll is often used to set the scene and create an atmosphere. For example, in the speculative design video called "The Mitigation of Shock (London)" by Superflux (Superflux, 2017-2019), the narrator's voice is layered and interwoven with a radio host announcing the

date (2050), and discussing price surges for grain, dairy and meat. The camera shots show the inside of a London apartment, with a pamphlet titled "I'm gonna go eat worms" and books such as "Pets as protein". Here, the background newscaster combined with slow moving descriptive camera shots offer context, but remain detached from a specific human life. However, in my case, the background noise in the recording is a starting point that triggers memory, entering a world I is familiar with, but also an emotional opening to multiple layers of mourning related to the breakup. Here, what could otherwise be seen as impersonal, almost aesthetic, B-roll detail takes on a stronger and deeper meaning.

By working directly with my data, I offer an alternative to the common assumption of a 'neutral' world—or neutral perspective—often found in speculative design. Luiza Prado de o. Martins and Pedro j. s. Vieira de Oliveira (de Oliveira & de O Martins, 2014; Prado & Oliveira, 2015) argue that by ignoring or remaining "blissfully unaware [...] of the existence of other realities" (Prado & Oliveira, 2015, p. 63), speculative design is missing the mark on its own political and critical goals and aspirations. They state: "the near-futures envisioned by the great majority of projects seem devoid of people of colour, who rarely (if ever) make an appearance in clean, perfectly squared, aseptic worlds. Couples depicted in these scenarios seem to be consistently heterosexual and bound by traditional notions of marriage and monogamy. There are no power structures made visible that divide the wealthy and the poor, or the colonialist and the colonised." (Prado & Oliveira, 2015, p. 63). These clean, perfectly squared, aseptic worlds are problematic as they obscure the real worlds (present and near future) in which real people live in—often marginalized people and people from underrepresented groups.

In contrast, our processes emphasizes the hyperlocality and the ultra precise nature of the speculation. In the process of accessing, reading, listening to, remixing, and interpreting my voice assistant data, I ground the speculation. The reclaiming and appropriation (as I discussed above) of this specific dataset is in itself an act of speculation: what do these sonic records mean for those generating them, in this case myself? What would a world be like if this data belonged to the producers of the data? Or, more precisely, how much more

meaning does this data have for me, when reflecting on my own home life and that unique period in my relationship? The reworking of the data, through remixing, also continued to reveal a more introspective world, offering new layers of the interwoven existence of myself, my partners, the voice assistant, and the ML and NLP systems. At the same time, this attunement to the data wasn't trying to represent another (new) distant world. On the contrary, the attunement itself revealed an alternate viewpoint into the present (or the near past). And this near past, or alternate view, was uniquely about me and my world.

Finally, the hyperlocal speculation of my work also responds to another critique of speculative design. In response to recent dialogues and critiques of speculative design, Matt Kiem challenges speculative designer Revell's claim that critical design situates itself "outside the market" in order to "project into uncertainty". Kiem responds that by keeping speculation outside of capitalist systems in fact protects them and actually evades true uncertainty and fails at being critical or political (Kiem, 2013). In my project, I worked directly within the capitalist world of Amazon's data, data centers, data processes and interfaces. I brushed up against the algorithms and natural language processing systems that Amazon uses for the purposes of 'understanding their users better', in order to sell more. I carved a space between the capitalist machine in which the data was captured and archived, and my hyperlocal home, experience, and relationships.

5.4.3 Committing to Slowness and Depth

Long deployments require an attention to the slow rhythms of research and design over time. In a note at the Design Theory session of CHI 2017 entitled "Pause: A Multi-lifespan Design Mechanism", Daisy Yoo and Batya Friedman describe "the use of pause as a strategic mechanism in design" (Friedman & Yoo, 2017, p. 463). They offer "a language for communicating about project inactivity that is distinct from project failure" by outlining a series of rhythms and heuristics for identifying and practicing different kinds of pauses in design and design research processes. Yoo and Friedman describe five rhythms of "pause": periodic hiatus, pending future event, tango, (temporary) closure, and laying fallow. Each of these

rhythms, or forms of pauses in research projects, is particular to a set of conditions and a corresponding level of attention to the aspects of the problem that might require pause. For example, the authors describe laying fallow as a process of pausing that "serves the purpose of refreshing people, resources or other aspects of the project." In this rejuvenating state, such a period works as a "counterpoint" to feelings of stress or burn out (Friedman & Yoo, 2017, p. 462). In our project, we (myself, Desjardins, and Rosner) each practiced laying fallow (asynchronously) for at least four weeks during the Summer of 2021 and during the Summer of 2022. For both of these pauses, we met beforehand to assemble a set of ideas and draft some abstracts that we would return to after a pause. Despite a period of dormancy, this form of pause allowed each of us to re-engage our project with fresh perspectives or what Friedman and Yoo call "renewed vigor and insights"(Friedman & Yoo, 2017, p. 462). During the latter half of Summer 2022, I experienced a great deal of uncertainty about whether or not I could continue working with data from their breakup. This pause lasted for a period of about four days, during which I did not engage with or analyze any data from the long deployment. Instead, I focused on other parts of the project that were not from the long deployment. I describe this form of pause as similar to "tango," except instead of "responding to the socio-political climate," it involved responding to the socio-emotional-labor climate of my relationship to the data.

While the strategies of long term deployments, pausing and revisiting allow for a general slowing down of the inquiry process, I also found that slowness had an important role to play at a more local level, right at the moment of analysis. In addition to taking pause when necessary, we also used creative media production (H. R. Biggs et al., 2021) techniques such as looping, reversing, and layering sounds as methods for slowing down. Slowing down was necessary while analyzing my data because the recorded sounds from interactions with the voice assistant IoT devices usually spanned only a few seconds in length. Through slowing down as a tactic for data analysis, we noticed discrepancies between the textual transcript provided by the voice assistant devices and the dialogue that we heard upon listening. We wanted to listen to the data in ways that would allow and encourage us to spend more time

listening to them, to hear more repetitions, to focus on particular sound or sounds that are quiet or seem to be missing in the original recording, and creative pairings and juxtapositions to evoke different associations in the listeners.

We noticed that we often needed to listen to the recordings multiple times before we could recognize sonic textures and details such as background noise, tone, or sounds of the home or neighborhood. Accordingly, we started to loop the audio clips and incorporated it as one of our tactics for a situated and collaborative listening practice. We also noticed that listening to the recordings on repeat, or looping, allowed us to gradually notice more of the background noises–highlighting the ongoingness of the backdrop, the ephemerality of the interactions that prompted the voice recording, and foregrounding sounds that were not part of what the voice assistant ever "intended" to capture. Slowing down when listening to data as a mode of data analysis allowed us to notice the sonic atmospheres that surrounded and informed each instance of data collection.

We also wanted to have some tactics for rendering the recordings especially strange to us, as we were curious if my voice might still be recognizable after remixing the .wav file to play in reverse. Again, this was a strategy that helped us slow down and pay attention. Although we recognized our bias in already being familiar with my voice–especially after listening to the data–we noticed that even when reversed, my voice was still recognizable. This led to conversations about what kinds of recordings, or what lengths of capture, might be necessary for voice assistant devices to identify and potentially profile people in their own homes. We considered this in tandem with our findings from looping recordings, in which the details and ambient noises of voice assistant captures might also obliquely reveal location, identity, or company at the moment of interaction with the device.

Moving towards a more nuanced understanding of relations between people and things encourages designers and HCI researchers to inquire within the temporalities of relations as they are entangled in the world over time, as opposed to fixing the empirical gaze upon the temporalities of interactions at the moments of acting upon one another. We learned from taking pause and looping data that long deployments are necessary for design inquiries that

seek to understand nuances in entanglements, relations, and relationships between people, technologies, and things over time. Moreover, long deployments produce data about using and designing technologies in ways that might center lived experiences and articulate the particulars of the design setting, personhood, and entanglements at stake in design and use

5.4.4 Near-Past Intimacies

The intimate quality of designing speculatively and autobiographically with domestic AI technologies became more apparent through working with data from the near past and speculating through creative audio data experiments. At first, opening up a spreadsheet and pulling out examples to use seemed like a simple enough task for our continued analysis. But a few lines into reading, I saw something in the voice assistant transcripts that brought back difficult memories of feeling unsettled and unsafe. I noticed my body reacting to the data. A reoccurring question emerged in this process of coming back to the data to find examples that might speak to our evolving concerns: *can or should I look at the transcript again?* I quickly found that the process of re-engaging the data raised notable challenges.

As a complementary challenge, I no longer recalled the context surrounding each data record. The same data that sparked memories of places and events just after it was recorded (e.g. that was the day we went out to the park) no longer marked particular sites. Adding this context by searching additional digital traces (calendar apps, text messages) only added complexity—evoking new and unwelcome memories. I did not want to look back at my calendar and revisit the new data. Without this context, comments that held significant meaning and purpose at one point didn't seem to hold the same weight any longer. The original data had a shelf life.

Together, these sensitivities emphasize the need to consider the stakes of nearness and how speculations are shaped by what the "near" of a speculation's near-past might be. While HCI speculative design tends to focus on near-futures, directing design activities toward imminent horizons, my process of autospeculation drew my attention to near pasts. Engaging with a near past—an experience in someone's life that has happened but still lingers in the

present—requires a different sensitivity than a near-future speculation. Complications arise from encountering not only the data that changes meaning over time (as depicted above), but also a version of oneself that no longer feels the same, a former self. Rather than see the 'nearness' of the near-future speculation as an asset for the imagination, a way of making the exercise more realistic or powerful, the 'nearness' of near-past speculation becomes an opportunity or a liability. As we described above, it can mean looking back at data that still carry emotional attachments to all the moments of struggle, re-encountering what was initially so troubling and upsetting about the situation that the voice assistant witnessed and documented.

5.5 Autospeculation in Practice: Opportunities and Struggles

My analysis so far explores my experience studying and speculating with my own data, an approach I have called autospeculation. Within my experiments, autospeculation emerges as a process of self-reflection that offers handholds for imagining a situation otherwise. At first blush, our collaborative process seems to share a reflexive sensibility with existing approaches such as self-tracking (Lupton, 2016; Neff & Nafus, 2016) or critical technical practice (Agre, 1997; Boehner et al., 2005; Sengers et al., 2006). To be sure, I recognize a common appreciation for and value placed on practices of self-reflection, whether tied to dedicated tracking technologies or otherwise. For example, Phoebe Sengers and colleagues (Sengers et al., 2006) point to the importance of reflection, defamiliarization, and critical awakenings as modes of surfacing values in computational design. With autospeculation, I explore these opportunities for values-analysis while exploring forms of imaginative self-discovery through digital encounters. My approach represents a reorientation of purpose. Rather than use self-tracking devices to know or change ourselves, our process deploys other-tracking tracking devices (those designed for technology firms to collect our data) to reimagine our relationships with technology. This speculative angle involves both the creative reuse of tracking methods as well as the tools themselves. In this sense, my work pushes on a need for more methodological handles on what it means to take part in critical technical practice, a form

of reflection and accountability. In addition to offering a case study of this process and outlining core tenants of the work, I see differences in emphasis—positioning the work of reimagining through self-discovery as a foundational practice of computational design.

As we see from working with my data, this self-reflection requires four re-orientations. First, it orients analysis toward a consideration of the power dynamics embedded in corporately controlled data. Rather than leave the data with a technology firm that extracts it, we see the value of learning how to use and reuse the data about ourselves——leveraging a certain form of data appropriation from within. Using data from ourselves over time raises particular concerns about ownership, power, and privacy. Our relations to the data exist on multiple levels when we consider their formal intended use and terms of use versus how people actually engage with data about themselves over time. Prescriptive models of personal data are often fabricated by the same powerful, corporate entities that develop the data-collecting devices in the first place. This often means that they are designed to collect data in ways that are maximally profitable and optimized for the goals of the technology developers within regimes of data capitalism. My analysis suggests autospeculative techniques might be useful for probing this dynamic—exposing the power relationships hidden within data.

Second, in taking from within my own data, I also find an emphasis on hyperlocal engagements–each offering their own starting points for analysis. Let's think back to the background noise that I heard in one of the recordings. That intimate backdrop of anti-queer violence worked as tool for sparking my memory and emotional connections to that place and time. We see how the extreme specificity of a digital record such as a sonic voice assistant recording can heighten its significance.

Across these reflections, I see a complementary emphasis on slowness–a third re-orientation–illustrating what insights might come from using design techniques to breathe and take pause. I find that data experiments stretch encounters to open opportunities for reading and interpreting gaps, silences, and residues. In doing so, they redirect the attention away from 'the market' of technoscience (positivistic, deterministic, capitalistic, utilitarian, top-down),

and instead re-orient speculation towards interpreting memories and data from recent and current lived experiences (interpretivist, inquiry-based, bottom-up) to think about data potentials in ways that meaningfully consider and incorporate the particulars of one's own lived experiences.

Lastly, our collaborative analysis exposes the complexities and tensions of working with data from the near past in thinking about the near future. Through retrieving, reading, and listening to the recordings from the devices, I sometimes noticed disparities between what I remembered about the past and what the archive remembered (or captured). When this happened, it prompted speculation about the moments in which our memories and our machines' memories become out of sync. The friction between human and machine memory is significant because autospeculation happens at the nexus between what someone remembers and what their device(s) remember. Discrepancies between human and machine memories are sites of great potential for autospeculation because they offer an opening for inquiring about how, why, and when the personal and mechanic recordkeeping diverged, and what the consequences of that diversion are over time. For example, we see how revisiting past data can risk placing emotional burdens on autospeculative analysts, forcing encounters with painful memories and triggering unwanted reflections.

In closing, I expand on the opportunities and dangers by further examining two productive tensions: the risks of revisiting and polyvocality. As the HCI and design communities embark on more first-person research projects, and as researchers might be interested in using autospeculation or expanding on our method, we feel a responsibility in sharing these tensions and raising questions. While in chapter 2, I share more details regarding the specific tactics for conducting autospeculation (choosing a dataset, developing creative activities to remix data, collaboration strategies, etc.), in this chapter, I emphasize lessons from our meta analysis. With these lessons, I describe autospeculation less in terms of a recipe or step-by-step tutorial, and more as a set of critical considerations and frictions.

5.5.1 Generative Tensions

In this section, I will expand on two generative tensions in autospeculation: 1) the risks of revisiting and 2) polyvocality.

Risks of Revisiting

When choosing an autospeculation method for a project, I encourage others to consider the timing of the project, at the start, but towards the (long) tail of the project as well. I find that the process of re-engaging data raises notable challenges. For myself, going through the description of data in the weeks following the breakup became part of processing a difficult period. But coming back to the data more than a year later, after the immediacy of the moment had long passed, opened old memories and sensitivities.

I also see that working with one person's data means that the data for co-speculation is asymmetrically legible. While I could recall many moments of interaction with the voice assistant through working with the data, there were still other interactions that I was not a part of, or had no way of knowing. For Rosner and Desjardins, working with my personal data meant the memory of the events mostly went through the storytelling that I generously offered while going through the data. The risk in revisiting data is that it would put a larger burden on my shoulder in terms of reinterpreting and recounting data stories again. As a complementary challenge, I had moved far enough away from the original data that it reignited difficult memories that had begun to settle. Memories of my former partner evoked emotions that still felt raw and under-processed; my data resurfaced past tensions that were just beginning to be forgotten, and also figured new ones within my current entanglements.

These observations raise important concerns around the risks of doing autospeculation. For myself, each encounter with the data requires a form of emotional labor that brings about strong physical and affective responses. While the emotional processing of autospeculation can be generative and perhaps even therapeutic, the risks of this level of emotional processing with the specificity and granularity of someone's own personal data are heightened when

working with personal data from difficult life experiences (Devendorf et al., 2020; Lustig et al., 2022).

Polyvocality

As a second generative tension, I consider how autospeculation may encourage a range of voices in the processes of analysis and speculation. Through its anchoring in the local, partial, and personal, we saw it invite grounded speculations with varied polyvocality. Polyvocal approaches to research and data analysis involve many people sharing their own experiences and contributing to a growing collection of situated and partial speculations. In this orientation, my analysis prompts a few important questions for HCI: whose voices should autospeculation elevate? For whom would this be the most important? And for whom are there the biggest risks?

On the one hand, as we reviewed above, our analysis could put me in a precarious emotional and physiological position—elevating risks of revisiting triggering content. On the other hand, the first-person aspects of this project create space for studying under-examined facets of technology use (such as queer relationships and breakup). Drawing attention to unexpected, mundane, and intimate moments may scaffold forms of polyvocality that promote the sharing of multiple experiences and perspectives. By inviting many people to share their own experiences, as I did in chapters 3 and 4 of this dissertation, this approach offers opportunities for expanding the diversity of stories our field tells about itself. This dissertation documents the development of autospeculation from its origins as a first-person technique to its capability as a community-level technique.

But, as for other first-person techniques such as autoethnography and autobiographical design, autospeculation raises significant concerns around the confluence of positionality and autospeculation. In centering one person, they risk also re-entrenching structural inequities by highlighting an already-dominant perspective. In this reflection, I emphasize the need to consider whether and how an autospeculative approach might give privileged people permission to design about themselves, elevating the perspective and world-views of those who

already have a platform and already do speculative design. In this sense, I take heed against what Oudshoorn and colleagues (Oudshoorn et al., 2004) (and later HCI scholars (Ames & Rosner, 2014)) observe as the 'I-methodology'—a technique for enabling a privileged design team to create technology in their own image: inscribing their designs with their own priorities, skills, and values (in their case related to an all-male design team and gender identity).

As a community, HCI scholars might use this reflection to cultivate a greater concern for questions of position within autospeculation as elsewhere. With a focus on the stakes of an intervention, we elevate the possibility, even if the potential for normative use still lingers. It is with continual care for multiple perspectives in the landscape of speculations that we may generatively shape what autospeculations ultimately bring. Autospeculation then presents an opportunity for people to engage in deep self-analysis and speculation with their own data, as well as a mode for people to engage in participatory, polyvocal archiving of lived experiences (as shown in chapter 4).

5.6 Conclusion

In short, my approach expands methods of data analysis with speculative techniques that prompt creative engagement and enriches speculative methods with first-person analyses that harness the intimate character of imaginative practices. More specifically, my introduction of autospeculation offers two main contributions to HCI literature on design and data analysis. First, I expand a growing set of methods for critically analyzing data (e.g. self-tracking, reflective design, autobiographical design) by using speculative encounters to inspire new forms of creative engagement with personal data. Second, I advance conversations on speculative design methods and their risks by integrating first-person approaches that deepen and enrich people's intimate relationships to data practices. This deepened intimacy highlights the forms of emotional labor, affective positioning, and uneven power dynamics wrapped up with personal data, illustrating the risks of highlighting an already-dominant perspective.

My work has tried to outline a process of data analysis that knits together facets of

speculative and autobiographical design, an approach I call autospeculation. This approach expands methods of data analysis with speculative techniques that prompt creative engagement and enriches speculative methods with first-person analyses that harness the intimate character of imaginative practices. In my revisiting of a study of queer use with conversational agents (chapter 2), we learn about the opportunities and tensions in attending to data by taking from within, speculating locally, committing to slowness and depth, and developing near-past intimacies. The fact that our approach began with a queer home grounded our inquiry. As we look to future practice, it is in these particular concerns for normativity, polyvocality, and the subversive nature of queer use that autospeculation might foster alternative relationships of mutuality and care.

5.7 New Insights About Autospeculation From Recent Studies

Autospeculation was developed within the context of exploring my own lived experience and my own personal data, alone and with collaborators. Chapters 3 and 4 have revealed new insights about the methodology, suggesting among other things that autospeculation can evoke memories that were once thought to be forgotten. For instance, in chapter 4 we saw that T recalled relationships that she did not remember until she engaged in an autospeculative probe activity. It could be that the data storytelling component of autospeculation helped to activate T's memories. It could be that the craft-based aspects of autospeculation that invite participants to do personal data storytelling in deeply tangible and materialist ways activated T's memories. Both aspects of autospeculation are critical and, as this dissertation demonstrated, can work together to capture and render design research participant experiences in new and important ways.

As this dissertation suggests, autospeculation could be used by designers and design researchers working on domestic technologies or other contexts of multi-user technology design. The range of technologies and data that have been studied using *autospeculation* includes but is not limited to: Google Calendar data, other digital calendar data, note-taking apps like Apple Notes, personal diaries and journals using tools such as Notion, photo

rolls, text messages, Facebook Messenger, and Instagram. These technologies and data span a wide range of contexts, but they all produce personal data that can be analyzed and remediated through autospeculation. Autospeculation is a process of physicalizing and synthesizing a wide variety of personal data streams and memories of lived experiences to engage in data storytelling through creative representation.

Autospeculation also teaches us that first person methods can develop into participatory design methods. This troubles the binary between first-person and participatory design methods–inviting design researchers to use self-experimentation and first-person techniques as a means of prototyping participatory design methods. As discussed earlier in this chapter, this also means that researchers should continue to consider the risks of revisiting personal data. Perhaps counterintuitively, my research suggests that one way for first-person researchers to mitigate these risks might be to share this personal data, or parts of it in abstract, with a trusted collaborator(s). In my experience, having conversations with other people about my personal data often validated my struggles and provided me with external perspective into my own lived experience. Additionally, I drew from my own lived experience of participating in research studies to inform the design of the participatory design activities that my participants completed. I kept in mind how difficult it can be to share your personal data with others, and considered the level-setting of the extent of information that does or does not need to be shared in each designed interaction. Bridging the gap between first person and participatory inquiry, this dissertation demonstrates that autospeculation is just one example of a method that can extend from first-person contexts into participatory design research. Through drawing on my own lived experience of autospeculation, I was able to warn my participants of the potential risks of autospeculation. I was also able to recommend ways of getting the most out of autospeculation with various different kinds of personal data and when autospeculating about different lived experiences of relationships. My lived experience of first person research was integral to the development of the participatory design materials and activities because it highlighted and made more visible the multifaceted forms of care that must be taken on by both the researcher and the participant.

In the broader scope of these new insights about autospeculation, I used autospeculation in the context of polyamory at both the individual and community levels. I propose the term *polyspeculation* to describe autospeculation at the register of community. Polyspeculation can allow us to more deeply understand speculation by, for, and with communities in addition to the individuals that make up said communities. Polyspeculation might also refer to the particular form of speculation carried out by polyamorous people at the community register– as evidenced by chapters 3 and 4 of this dissertation. Designing for polyamory and for polyamorous people means inquiring at both individual and community levels in order to understand the personal and the collective contexts of technology use and design. In the next and final section, I will describe "Design for Polyamory" as a mode of engaging with polyamorous people through HCI design and design research.

5.8 Design for Polyamory

As Jacobs et al., 2016 have shown in the context of mononormative couples' device use, people often share technologies in their homes. Designing with polyamory proposes that we no longer assume only two people at most will be co-using technologies, and instead work to develop a broader frame of view that takes into account the possibility and occurrence of polyamorous co-dwelling and co-use of technologies in the home. As this dissertation showed, these users may change over time as people come and go from relationship forms. In some ways, designing for polyamory is as much about attending to time as it is about attending to group relationship forms. Attending to group relationship forms can be thought of as showing concern for questions of multi-user interaction, while attending to relationship timelines and fluidities can be thought of as showing concern for mutability.

Designing for group relationships such as polycules and chosen families centers participant lived experiences, foregrounds guided engagements with existing pools of personal data, encourages material, craft-based approaches to personal data storytelling, and promotes a mode of design research and design practice where we advance the design fields through a pro-active knowledge of and care for the current and expanding diversity of intimate relationships.

VITA

Brian Kinnee completed their PhD at the University of Washington in the Department of Human Centered Design and Engineering (HCDE) under the co-advisement of Daniela K. Rosner, PhD and Audrey Desjardins, PhD in 2024. Their work was supported by National Science Foundation (NSF) Grants 1947696, 2222242, and 2236822. Kinnee's work has been published at ACM conferences such as Designing Interactive Systems (DIS) and Human Factors in Computing Systems (CHI), as well as in journals such as *Design and Culture*.

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