Empowering Uncertainty Resolution for Marginalized Populations through Social Technologies

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For my sisters Robyn, Rebecca, and Caroline

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Abstract

We all experience uncertainty every day. What will the weather be like? Will I pass my exam? Will my sister call me back tonight? Sometimes the uncertainty we experience can be overwhelming and the stakes can be very high. Will my paycheck arrive on time to pay my rent? What was the result from the medical scan I had yesterday? For people from marginalized groups, the stakes of even those 'everyday' types of uncertainty can become overwhelming and provide unique and difficult threats. Did the teacher not call on me because I'm a woman, a person of color, both, or neither? Am I being pulled over because of my race, and what can I do right now to keep myself safe? In my research, I study how marginalization amplifies the impact of uncertainty and how technology can intervene to empower people in labeling, navigating, and reducing uncertainty. In some situations, uncertainty can be used to create enticing motivation to learn more and gain competence. For example, puzzles present uncertainty that can be fun and encourage learning. However, in other situations, overwhelming uncertainty can be stressful, causing undue burdens to cognitive load. For example, acts of discrimination in the workplace can create uncertainty about a person's standing and ability. In this thesis I seek to study and design tools to empower uncertainty reduction for people from vulnerable groups. First, I explore how to increase comfort with uncertainty through transformational game design when uncertainty may be expected and even necessary - in STEM contexts for adolescents from underrepresented groups. Next, I explore a context where little is known about how marginalization and uncertainty interact - examining social support-seeking for adults who have experienced interpersonal racism through interviews. I then conduct participatory design workshops with targets of racism; towards this work I present methods for using interactive fiction for facilitating participatory design around sensitive topics such as racism. Finally I design and evaluate provotypes (i.e., a design provocation and prototype) for more empowered futures in coping with the uncertainty that stems from experiencing racism. This thesis contributes theory in how marginalization amplifies the negative consequences of uncertainty, methods for design research with people in marginalized contexts, and the design of games and artifacts that both use uncertainty and are aimed at uncertainty reduction.

Contents

Chapter 1: Introduction

We all experience uncertainty every day. Consider an undergraduate student at a university in the U.S. When she wakes up she might wonder, what will the weather be like? During a lecture in her advanced statistics course, she raises her hand to answer a question but her professor calls on another male student. She may or may not wonder why she was not called on. Later in the day when she is purchasing groceries at a local convenience store, the cashier may be unfriendly to her. She also may or may not speculate why the cashier was being unpleasant. Depending on the context and situation the student is in, the uncertainty she experiences throughout the day may have a varying impact on her. As a woman who is underrepresented in mathematics, she might question if she was ignored in class due to her gender. The stakes may be raised if this is a repeated event and she has never been called on by her professor despite repeated attempts to participate. However, as a white woman, she may have little uncertainty or care very little about the cashier. As a woman of color, the situation might change entirely. Now the unfriendliness of the cashier could pose the additional question, are they being unfriendly because they are suspicious of me due to my race or were they just in a bad mood today? If it was due to my race, will it be safe for me to shop here again in the future? Again, uncertainty and anxiety are likely compounded for this student after repeated experiences being followed in stores by store clerks who are similarly exhibiting prejudice and racism.

Depending on the context, uncertainty may be viewed as either an aversive or motivating state. In those every day innocuous experiences, uncertainty might spur you into action (e.g., checking the weather) or may just be lingering in the back of your mind. When the stakes are higher or the uncertainty greater there is a larger impact on your cognition, perhaps causing stress or anxiety. For people from vulnerable populations, the stakes of even those ‘everyday’ types of uncertainty can become overwhelming and provide unique and difficult threats. Did the teacher not call on me because I’m a woman of color? Did that police officer pull me over because of my race? If it was because of my race, how often will this happen to me in the future? Not only do these forms of uncertainty pose legitimate and serious threats, but the experience of constantly evaluating

interactions through a lens of marginalization causes undue burden over a lifetime of accumulating aggressions and microaggressions.

In my work I study the impact of varying levels of uncertainty on marginalized populations (used interchangeably in the context of my work with vulnerable populations). In this work I start from a position using information-gap theory to describe uncertainty as a person's awareness of a gap in their own knowledge (Loewenstein, 1994). The perceived size of the information gap as well as the person's feelings of competence to narrow or close the gap impacts their desire for information avoidance or acquisition, as well as desires for risk or ambiguity. Predominant theory proposes that when uncertainty is at a manageable level, it can be pleasurable. In fact, it has been proposed that people have individually-varying levels of preference for uncertainty (Loewenstein, 1994). It helps define the parameters of what they know and what they do not yet but desire to know, and small amounts of uncertainty following a positive event can actually lead to prolonged feelings of pleasure (Wilson et al., 2005). However, this theory does not take into account experiences of uncertainty that are tied to marginalized identity. When information gaps are too large and uncertainty is overwhelming, it can cause people to feel threats to their sense of self and ability, feel anxious, or disengage entirely. That overwhelming uncertainty gap can have both short term and long-term consequences such as anxiety, disengagement, and long-term impacts to physical wellbeing. Framing ambiguous and uncertain experiences that are tied to marginalization as being as "pleasurable" in these cases is inappropriate. The primary goal of this work is to develop understanding of the relationship between uncertainty and marginalization and to empower people in keeping their uncertainty at manageable levels, specifically by providing tools and methods for either reducing uncertainty, expressing uncertainty, or feeling comfortable living with uncertainty.

I have studied uncertainty in two specific contexts with varying levels of stakes for vulnerable populations. First, in the Sensing Curiosity in Play and Responding (SCIPR) project I have studied how uncertainty can be used to motivate curiosity and action in STEM and educational game contexts. Games are a natural delivery mechanism for uncertainty and provide a safe context for experiencing negative emotions related to failure and the risk of failure. The goal of

this project is to empower marginalized adolescents to express their intrapersonal uncertainty, regularly encounter and live with reasonable levels of uncertainty, and feel they have the tools and competence to reduce their uncertainty.

Second, in the Coping After Racist Experiences (CARE) project I have studied how uncertainty can motivate social support-seeking following experiences with racism. In experiences with racism, the impact of uncertainty can span every aspect of the experiences (e.g., the nature of it, the motivation of the perpetrator, the future consequences, etc.). Prior work indicates that uncertainty reduction through validation from friends and family can be a powerful tool in coping with racism (Sue, 2010). The goal of this project is to facilitate empowered futures of coping with interpersonal racism through uncertainty reduction through the design of social technologies.

In chapter 2, I discuss background and related work. First, I will provide the definition I am utilizing for uncertainty which focuses on the awareness of an information gap. Second I will provide background on different contexts of vulnerability and marginalization and the specific impact of uncertainty for vulnerable populations. Finally I will discuss design principles and considerations when designing for and with uncertainty.

In chapter 3, I discuss my first study, embedding uncertainty in an educational game that encourages students who are marginalized in STEM contexts to be curious. This work discusses how to design contexts that make uncertainty comfortable and safe as opposed to threatening and how to make players feel competent in reducing their uncertainty.

In chapter 4, I discuss my second study, which examines how people experience uncertainty related to experiences with racism. This work explores how uncertainty motivates social support-seeking behaviors as a type of coping mechanism, as well as the different sources of uncertainty that arise when people experience racism.

In chapter 5, I present my third study as well as methodological contributions. I designed a method of participatory design, Foundational Fiction, that uses interactive fiction vignettes about racial microaggressions on Twine to create a foundation for participatory design participants to

discuss sensitive and vulnerable topics. The third study used this method of participatory design workshops to envision and brainstorm future technologies for coping with interpersonal racism.

In chapter 6, I present the design and evaluation of three provotypes that embody the design themes and proposals from participants from the participatory design workshops. I adapt the interactive narrative vignette from the Foundational Fiction method for the remote user testing of the three design provotypes. In chapter 7, I summarize the contributions of this thesis, share reflections on my work, and outline opportunities for expansions of my research and methods.

Everyone deals with uncertainty. In some situations these experiences can be enjoyable and encouraging. In others it can be unpleasant and stifling. For people from vulnerable populations, there are unique circumstances that multiply the impact of uncertainty largely in threatening ways. In this thesis I propose to address this inequity of experiences by studying and creating tools to empower people from vulnerable and marginalized groups to reduce their uncertainty. This thesis contributes co-design methods for working with people in vulnerable and marginalized contexts, design artifacts including social and individual games that engage with and aid in coping with uncertainty, and theory in designing for uncertainty reduction through social technology. More broadly this work connects notions of design justice with racial justice through the game design practice and human-computer interaction research and design.

Chapter 2: Background

Related work discusses how we define uncertainty, the impact of manageable and unmanageable amounts of uncertainty, the specific contextual impact of uncertainty for vulnerable and marginalized populations, and finally, how to design for uncertainty. The focus of this review is the emotional experience of varying levels of uncertainty.

2.1 Defining Uncertainty

In my early work I define curiosity through an uncertainty lens in order to design games for curiosity. A survey of the literature on curiosity provided insights about the affective and behavioral experiences of and responses to curiosity, in particular the emotional consequences of uncertainty and the risk of failure and the key mediating role played by exploratory responses, such as question-asking, in managing those emotional consequences. These insights directly informed the development of a working design model of curiosity and, as we foreshadow in each of the following subsections, produced concrete game design goals that directed the development of *Outbreak*.

Curiosity can be understood as an appetite for information or the desire to fill an information gap (Loewenstein 1994). This gap, a violation of what is known or expected, can motivate a range of responses depending on the affective state that the newly salient uncertainty triggers. Among the factors that affect whether this discomfort is felt as a curiosity "itch" rather than an aversive "irritant," an individual must see themselves as able to close that information gap and resolve the uncertainty (Proulx & Inzlicht, 2012). If the gap in knowledge is too wide to be perceived as surmountable - for example, if a student believes they are not capable of learning a new subject - it can result in frustration, disengagement, or trivialization (Proulx & Inzlicht, 2012). If the gap is too narrow - as in the case of a student who gets the answers to the test ahead of time - it can inspire indifference, as the gap is not seen as challenging, surprising, or compelling enough to merit further investigation (Engel, 2013).

2.2 Uncertainty and Marginalization

Theoretical conceptions of curiosity and uncertainty largely have taken a detached view of uncertainty as a gap between current and complete knowledge. However, this stance is not fully applicable to uncertainty that is relevant to one's identity or self-concept. For people who are vulnerable or marginalized, the impact of uncertainty is amplified and the process of reducing that uncertainty to a manageable level is not likely to be a pleasurable experience. This section provides critical theory and context for work centering on marginalized experiences including: 1) modern theories of race and racism, particularly as they pertain to the United States and 2) marginalization in STEM contexts which applies both to people from racial minority groups as well as women. We emphasize theories and research explaining how subtle forms of racism manifest and impact people from racial minority groups. We also discuss the role of uncertainty and social support in processing and coping with those experiences.

2.2.1 Theories of Race and Racism

A large portion of the population in the U.S. deals with racism on a near daily basis. For the purpose of this dissertation, I am focusing on the construct of race from a U.S. perspective and acknowledge that racial and ethnic identity often operate differently and have entirely different historical contexts in other parts of the globe. Racism can be defined in three parts: 1) one group believes itself to be superior, 2) the group that believes itself to be superior has the power to carry out the racist behavior, and 3) racism affects multiple racial and ethnic groups (Soloranzo et al., 2000). The belief of superiority need not be conscious in order to perpetuate racism. In situations of aversive racism, a person's denial of their racial prejudices (which are often reinforced through sociocultural processes) may manifest in interactions with racial minority members as discomfort, fear, uneasiness, disgust, and/or avoidance (Dovidio & Gaertner, 2004).

In fact, race scholars state that in modern society racism has not gone away, but, rather, it has morphed (Dovidio et al., 2002, Nelson & Pang, 2006). Derald Sue defines "modern racism" (aka aversive racism, racial microaggressions, symbolic racism, etc.) as: 1) "highly disguised,

invisible, and subtle forms that lie outside the level of conscious awareness," 2) "hiding in the invisible assumptions and beliefs of individuals," and 3) "embedded in the policies and structures of our institutions" (Sue, 2010). Modern racism is covert, implicit, and not always under conscious control (Dovidio et al., 2002; Jones, 1997; Nelson & Pang 2006).

Microaggressions can refer to unintentional insults in regards to race (as well as gender and sexuality) (Minikel-Lacocque, 2013). For example, complimenting an Asian American person on their ``good'' English language skills betrays an expectation of poor command of the language and, in the process, negates the target's U.S. heritage and reinforces their status as a perpetual foreigner (Sue et al., 2007).

The unintended nature of microaggressions makes them inherently ambiguous. Targets often feel uncertainty about the racist nature of the aggressive act. In the example just provided, the individual paying the compliment may have done so with the best intentions of giving praise, oblivious to the fact that their statement was biased and offensive. For targets, ambiguously negative experiences, especially those that are easy to dismiss as "small" such as microaggressions, tend to linger longer and weigh heavier in a person's mind (Gilbert et., al 2004). In fact, cardiovascular response is notably elevated in response to ambiguously racist events compared to overtly racist ones; subtle racism erodes heart health over time through psychological stress (Merritt et al., 2006). People tend to downplay and underestimate how those microaggressions will impact their lives and thus may be less likely to seek support to counteract those effects. Rather than downplaying emotional responses, it may be more appropriate to shift the emotions felt (e.g., from anxiety to anger, from confusion to resolve).

For this reason, validation of the target's experience is crucial. Otherwise, targets often question whether they are being overly sensitive or petty, rather than accepting that the interaction was a microaggression (Sue et al., 2007). In these instances, the `sanity check' is the most frequent and necessary social support a target desires. It allows them to reaffirm their experiential reality, feel that others share their experiences, and immunizes them against future microaggressions by forming the notion of a shared group experience (Sue, 2010).

To this end, communicating these experiences to others and seeking their support can be a critical part of coping with the event. However, on many occasions, the process of relaying an experience with racial microaggressions can be discouraging. Specifically, the person to whom the target communicates their experience might display *microinvalidations* - subtle cues that signal a lack of belief or acceptance of the subjective reality of a marginalized person and directly negate, rather than validate, the target's lived experience (Sue, 2008). This work seeks to understand how ambiguity and uncertainty as experienced by the targets of the racist experience impact their processing, meaning-making, coping, and social support-seeking related to the event.

Although beyond the scope of this dissertation, a final point I want to acknowledge about race and racism is its intersectionality. Intersectionality is an identity framework that asserts that we cannot treat portions of our identity discretely (Crenshaw, 1990). In the canonical example, treating the experiences of black women as a combination of the experiences of black men and the experiences of women results in erasure of that unique experience. In this thesis I focus on racial experiences, but acknowledge that for many of my participants, their experiences with racism are inextricably tied to other aspects of their identities which may complicate their support-seeking tendencies.

2.2.2 Marginalization in STEM

In STEM contexts (i.e., science, technology, engineering, and mathematics) both women and racial minority group members are marginalized and underrepresented at nearly every level of the pipeline (Burke et al., 2007). In the STEM context, marginalized groups may be dealing with higher levels of uncertainty broadly while assessing their standing, ability, and perceptions of their peers and superiors. In this section I briefly describe some of the contextual factors that marginalize women and racial minorities in STEM.

Lack of representation and marginalization has both short-term and long-term impacts for people in STEM. Women and racial minority group members see far fewer examples of successful peers and superiors in STEM and are provided with fewer opportunities (Burke et al., 2007). These

opportunity gaps can bear out in individual contexts (e.g., a teacher calling on female students less than male students for in-class participation) but can also bear out in larger systemic contexts. For example, a 2001 study for the National Action Council for Minorities in Engineering found that while interest in advanced mathematics was greater amongst racial minority girls in 5th to 11th grade, the availability of those courses was far less at the minority students' schools (Heaverlo, 2011).

Even for someone who has overcome those hurdles, the pressure of being a part of an underrepresented group can be damaging to performance. For example, stereotype threat research demonstrates that the activation of stereotypes about one's identity group creates a state of cognitive load that detracts from available working memory and interferes with optimal problem solving and decision making in learning contexts (Schmader & Johns, 2003). Additional factors outside the classroom can also impact performance for marginalized students. For example, students from low-socioeconomic backgrounds tend to live with higher levels of cognitive load from the daily realities of dealing with poverty, stress, or trauma (Mani et al., 2013; Sirin, 2005).

The SCIPR project focused on addressing marginalization in STEM at the middle school level when identity formation is at its earliest stages. Around adolescence children develop firm beliefs that are formed around which subjects in school they are good or bad at, which becomes a more permanent fixture of their self-image. At this age, STEM coursework tends to also drastically increase in difficulty (Jones, 2000) resulting in increased feelings of anxiety around ability to do well (Beilock et al., 2010). These two combined factors of difficulty and identity formation create huge barriers to STEM long-term engagement. While this is challenging for all students, students who are marginalized face additional barriers discussed above when it comes to STEM engagement. In order to interfere in this relationship between perceived ability and identification with a topic, the SCIPR project focused on designing curiosity transformational games to increase comfort feeling uncertain as well as comfort with risk of failure as a buffer to long-term disengagement with difficult or challenging topics in STEM.

2.3 Designing for Uncertainty

Knowing that uncertainty can both be a force for and barrier to action, we may consider how we can design both for and with uncertainty. When uncertainty is a motivator for action, it is because it provides enticing curiosity gaps that a person may feel competent and even excited to bridge. Manageable uncertainty can be utilized to present pleasurable experiences that empower a person to engage and gain new knowledge. When uncertainty is a barrier to action, it is typically because the uncertainty has become unmanageable. Perhaps the stakes of the uncertainty are too high. Perhaps the person does not feel they have the skill or ability to address the uncertainty. In all of these cases, both the pleasant and unpleasant ones, feelings of competence to reduce uncertainty and action taken to reduce uncertainty is the goal. In this section I describe two contexts in designing for uncertainty. In 2.3.1, I describe designs that motivate question-asking and necessary encounters with the risk of failure as a way to encourage people who are marginalized in STEM to regularly confront uncertainty while being given tools to reduce it. This design is performed within game contexts to increase feelings of comfort and competence with uncertainty that can translate outside of the game. In 2.3.2, I describe the stakes and context in designing for uncertainty around racism. The proposed work of this thesis addresses the open question of how best to design for uncertainty within that context.

2.3.1 Designing for Curiosity and Uncertainty in Games

The goal of the SCIPR project is to encourage and foster curiosity by embedding uncertainty within transformational games. During our design process we utilized playtesting and iterative design methods that account for the particular needs of marginalized and underrepresented groups (Fath et al., 2018). In designing for curiosity, I provide background for two kinds of motivating uncertainty: 1) designing for comfort with questions and 2) designing for comfort risking failure. Both question-asking and risking failure require added vulnerability for people from marginalized groups.

In designing for curiosity, we need to create compelling information gaps that game players can become aware of and feel challenged by, but that they also feel capable of resolving. Presenting

players with elements or experiences of uncertainty is a key component of existing models of game engagement (Costikyan, 2013), and our own work has begun to further elucidate the links between curiosity and uncertainty from a game design perspective (To et al., 2016a). At the same time, if uncertainty becomes unmanageable or uninteresting to players, it has the potential to disrupt the experience of flow by creating an imbalance between perceived challenges and perceived skills (Csikszentmihalyi, 2014).

As game designers, we can seek to create games that encourage an instance-specific curiosity known as state curiosity (Carlin 1999). In addition to presenting moments of uncertainty to players, ensuring that the uncertainty presents the appropriate level of challenge, and equipping them with the skills to navigate and resolve that uncertainty, supporting uncertainty means triggering positive affect. Challenge is known to be one of the core pleasures of gameplay (Hunicke et al. 2004). In moments when players have both the ability and the desire to answer questions, a "virtuous cycle" of curiosity can therefore occur, in which players cyclically uncover information gaps, become immersed in the search for answers, and become more deeply engaged in the play experience (Engel 2013; Jirout & Khlar 2012). That is the primary focus of this thesis. As discussed in more detail below, the design of *Outbreak* specifically aimed to provide social and instrumental supports for confronting and overcoming uncertainty - for example, by making the confrontation of uncertainty a shared, collective experience and equipping players with resources to scaffold the question-asking process. Of course, game design may also aim to have a lasting impact on player's trait-level curiosity (i.e., their individual preferences for uncertainty). While the concepts discussed here may be extended towards long-term changes in trait curiosity, that is beyond the scope of this thesis.

One safeguard against disengagement is the provision of tools that allow players to mitigate uncertainty and build self-efficacy around their ability to close information gaps (Proulx & Inzlicht 2012). The tool that we focus on here is the use of *questions*. When players encounter uncertainty, they can ask questions in order to express their curiosity, and they can use the information they receive to resolve information gaps. Questions are particularly useful for games utilizing hidden information or unsolved puzzles to build uncertainty (Costikyan 2013). Players

can pose inquiries (e.g., to the game itself, to one another in social deception games, etc.) to reduce the information gap. Furthermore, in collaborative games like *Outbreak*, in which players have unique resources, questions may also aid in collective knowledge assessment. When players discover new information through their questions, question-asking can invoke the pleasures of discovery and exploration (Hunicke et al., 2004). Even the feeling of anticipation as the player waits to see what they will discover can be a source of pleasure in gameplay (Schell 2014).

While questions are a valuable tool for reducing uncertainty, guiding players toward greater comfort asking questions can be challenging. People's relationship with questions influences their likelihood to entertain and willingness to voice those questions when facing uncertainty. First, individual personality factors such as assertiveness, self-esteem, and social anxiety determine one's general likelihood of asking questions (Mahdikhani et al., 2016). Second, social and situational cues indicate the cultural norms of question-asking in a given environment (Rocca 2010). For example, voicing uncertainty through question-asking can pose a social risk, but can also serve as a valuable means of assessing the relative or collective knowledge of the group (Mohammed & Dumville 2001). Finally, a person's perception of an authority figure can alter their relationship with questions. In the classroom, students' perceptions of a teacher as supportive versus condescending can dramatically alter their likelihood of asking questions (Mahdikhani et al. 2016). In game contexts, this might include player relationships with a gamemaster or with fellow players who have more information. In addition to comfort asking questions, we acknowledge that the content of those questions is of great importance but falls beyond the scope of this work. While developing better question formulation skills can increase the odds of getting information that reduces information gaps, good questions can also reveal new gaps through the knowledge they yield.

Designing for curiosity means supporting positive affective experiences in the face of uncertainty, particularly when risking failure. However, positive affect is by no means a given when it comes to confronting uncertainty. Acknowledging a lack of information or a gap in knowledge can be an aversive state. Leading theories of curiosity posit that self-efficacy, the perceived ability to fill an information gap, plays a key role in determining whether uncertainty

triggers affective states that are more positive or negative (Loewenstein 1994). If the level of uncertainty is too high, if the information gap is not obvious, or players do not perceive themselves as being capable of surmounting the challenge, curiosity may be stifled through the threat of failure (Berlyne 1966; Litman & Jimerson 2004; Loewenstein 1994; Proulx & Inzlicht 2012; Engel 2013; Rinkevich 2014). In contrast, when individuals experience the risk of failure as energizing, knowledge gaps can be framed and experienced as a challenge to overcome (Litman & Jimerson 2004; Loewenstein 1994; Berlyne 1966). Finally, in group settings, attitudes toward failure are often socially constructed - groups develop norms about expressing uncertainty and enforce social consequences for disclosing ignorance (Feldman 1984). These norms affect how much a person is willing to disclose their own knowledge, or lack thereof, to the group.

In particular for young students who may be marginalized, games are effective tools for designing interventions (Hughes, 2007; Kaufman et al., 2015). In games, the affective and social consequences of failure may be reduced compared to non-game contexts. Klopfer, Osterweil, and Salen (2009) identified failure as one of the five "freedoms" of play - while we cannot truly "fail" at play, we can do things during play that look like failure in other contexts but with lower risk and a more explicit opportunity for learning and growth. Similarly, Gee (2003) writes that in games, the risk of failure is lowered and, in fact, that failure is a good thing - players can feel empowered to take more risks, get feedback when they fail, explore more, and ultimately learn from the experience. Juul (2013) argues that failure may be the central aesthetic experience of play. By confronting players with their limitations, games can provide players the opportunity to emerge victorious over their past failures. According to Juul's analysis, becoming a better player means becoming a better fail-er. In short, games are already suited to pose potential failures as learning opportunities. However, game designers must still take into account players' varying emotional relationships with failure and imbue their games with safeguards to help players maintain a positive affective state (i.e., one that is motivated and energized rather than discouraged or disinterested). Below, we detail how we identified such safeguards in the iterative design of *Outbreak*, including the reduction of game elements that heightened players' anxiety about the consequences of failure (such as the potential loss of a character) and the importance of

replayability in helping players realize opportunities to learn from and rectify their previous failures.

2.3.3 Designing for Uncertainty Around Social Support and Vulnerable Self-Disclosure

In designing for coping after racist experience, as we do in the CARE project, there are additional considerations for vulnerability. Namely, seeking social support following racist experiences often necessarily requires high levels of vulnerable self-disclosure. Support-seekers must consider not only who is available and who has the tools to help, but also who is a “safe” person to disclose to. Will a potential supporter be comfortable discussing the sensitive topic of racism? Am I exposing myself to additional scrutiny and additional racism?

Social support is generally accepted to be helpful in mediating stress through a proactive coping strategy (Greenglass, 2002). The presence of support helps individuals deal with uncontrollable and emotionally difficult life events by providing a "buffer" against the potentially adverse effects of stressful or difficult situations (Sharma & De Choudhury 2018).

Social support can happen through a variety of avenues, whether it is in-person or mediated through communication technology (e.g., online, phone call, etc.). Some forms of in-person social support such as formalized psychological support groups may not be fully utilized by some populations due to fundamental differences in receiving formal treatment or legal barriers to official support from licensed psychologist across state lines (Dietrich, 2010; Barnett, 2011). In these cases, informal support options may be preferable. For example, simply engaging in social acts of meaning-making has been shown to contribute positively to trauma survivors' coping processes (Park & Ai, 2006).

People may go online for informal social support due to the lowered logistical barriers. They may utilize social networking sites such as Facebook to privately message those in their immediate network, to post to their entire network through a status update, or to reach out beyond their network to the community at large (Ellison et al., 2014). People who don't actively post, but instead "lurk" also reap the benefits of social support by reading about other's experiences as they gain access to other people with similar challenging conditions (Lieberman

& Goldstein, 2005). Even in formal social support, such as online therapy, clients have reported feeling less self-conscious, less inhibited, and better able to express themselves online (Loue, 2016). The anonymity afforded by online interactions means that individuals have more freedom to share potentially stigmatizing experiences without as much fear or disapproval (Dietrich, 2010). On the other hand, anonymous interactions entail concerns about the lack of accountability, dubious quality, and loose confidentiality (Ghenai & Mejova, 2018). Furthermore, anonymity is a double-edged sword, where the person reaching out is susceptible to hostile or derogatory comments and online harassment, problems that are exacerbated by the inhibition that comes with a lack of identifiability (Highton-Williamson et al., 2015).

Designing for coping with interpersonal racism means addressing a situation and context where a positive affective response is neither likely nor appropriate. Here the uncertainty is far more likely to create aversive states and so instead a more appropriate goal may be to identify the specific sources of uncertainty and design not to create positive states, but manageable states that are sensitive to the emotional, mental, physical, and practical burdens of experiencing racism.

To a certain extent, seeking social support for personally traumatic experiences such as racism inherently requires self-disclosure (i.e., sharing information about oneself). Self-disclosures on social media networks pose both benefits and serious risks when it comes to support-seeking. For the most part, social media disclosure tends towards positive or indirect revelations in public spaces. That is, when facing a broad and partly unknown audience, people avoid writing negative posts and/or indirectly referencing negative emotions and events due to potential stigma (Vitak& Kim, 2014). For disclosure of sensitive topics, these concerns may be amplified to risk of harassment, damage to reputation, and rejection (Debatin et al., 2009).

In particular, when discussing race and racism online, anonymity often gives way to the expression of negative racial attitudes and an eschewing of the normal constraints of accountability and social desirability that curtail the expression of racist views (Glaser et al., 2002; Steinfeldt et al., 2010). Picca & Feagin's ``Two-Faced Racism'' theory posits that racial ideologies still exist in modern America, but that social desirability has shifted their locus (Picca & Feagin, 2007). Racism tends to occur more in private spaces (i.e., backstage) as opposed to

public spaces (i.e., frontstage). Online forums exist in between the front and backstage spaces by protecting perpetrators from the social consequences of public expressions of racial prejudice, while still exposing people from racial minority groups and others to expressions of racial discrimination and other harmful attitudes (e.g., invalidation, etc.). These risks present additional hurdles for self-disclosure of racist experiences.

However, there are many benefits to online social support. For one, the ability for global reach of social media makes available a great number of community resources and immediate support options (Andalibi et al., 2018; Debatin et al., 2009). Additionally, there are many tools that allow support-seekers to curate and target their audience. Indirect posts about sensitive topics allow the poster to selectively address audience members who understand their message while filtering out those who may criticize the poster (Andalibi et al., 2018). Typically, direct self-disclosures about sensitive topics are posted in private groups or communities that are built around the specific topic. By selectively choosing what to post and where to post, support-seekers can mitigate the risks of public alienation.

Online spaces can also provide unique benefits when discussing race and ethnicity. For example, accessing racial-ethnic communities online can allow for connection as a way to construct and explore identity at a large scale (e.g., Asian-Pacific Islander identity deliberation on Reddit (Dosono et al., 2017). Online spaces can provide unique access to communities of color that racial minorities might not otherwise have a chance to interact with in their daily lives (e.g., queer youth of color expression and self-disclosure on Tumblr (Cho, 2018).

In this work we seek to understand what offline and online sources of support targets of racism turn to as well as how the medium of communication affects their experiences.

Chapter 3: Modeling and Designing for Key Elements of Curiosity: Risking Failure, Valuing Questions

In this chapter, I present a design model of curiosity that articulates the relationship between uncertainty and curiosity and defines the role of failure and question-asking within that relationship. This work was published at the Digital Games Research Association Conference (DiGRA) in 2017 in collaboration with Jarrek Holmes, Elaine Fath, Eda Zhang, Geoff Kaufman and Jessica Hammer.

We explore ways to instantiate failure and question-asking within a cooperative tabletop game, share data from multiple playtests both in the field and lab, and investigate the impact of design decisions on players' affective experiences of failure and their ability to use questions to close information gaps. In designing for comfort with failure we find that helping players manage the aversiveness of potential failure can help prevent it from stifling curiosity and that affective responses to failure can be modified by aesthetic decisions as well as by group norms. In designing for comfort with questions we find that empowering quieter players supports the entire group's efforts to express curiosity, flexibility in enforcing rules fosters curiosity, and questions can serve multiple simultaneous roles in supporting and expressing curiosity. We discuss how these findings can be used in other games to support curiosity in play.

Fostering curiosity - a mindset that relishes uncertainty and motivates its reduction through inquiry and exploration - is a common goal in game design, but is nonetheless an undertaking that presents considerable challenges to designers. Whether player curiosity is viewed as a means of triggering and sustaining engagement during play or as a transformational aim of game play itself (e.g., to trigger players' curiosity about a particular topic or context featured in the game), designers must contend with the fact that curiosity involves acknowledging gaps in one's own knowledge and taking steps, often without any guarantee of success, to reduce them (Loewenstein 1994). Thus, curiosity requires individuals to frame *uncertainty* and *the risk of failure* in a positive light, to be motivated and energized by unknowns, and to accept that one is bound to make mistakes in the pursuit of discovering new knowledge. A key factor in

facilitating this positive framing, we argue, is an individual's affective (i.e., emotional) experience of uncertainty and failure. In the face of uncertainty, will individuals feel capable, well-equipped, and secure in their ability to reduce a gap in knowledge, or will the anxiety of the unknown, a lack of self-efficacy, or insufficient agency prevail?

Within a game, designers can construct contexts and situations that influence individuals' curiosity-relevant affective states. Games are rife with moments of uncertainty and failure and, if designed with an understanding of the role of player affect, can offer players a safe environment in which to experience these potentially aversive states as motivating rather than threatening (Gee 2003). For example, most games are repeatable experiences, giving players the opportunity to learn from or correct previous mistakes - and to view past or present failures as challenges, not threats. Presenting players with the *right* amount of safety to confront uncertainty and failure, however, requires a delicate balance - if repeatability completely removes uncertainty and the potential for failure, then curiosity itself is thwarted. Thus, shifting the safety balance too far in one direction can result in either disinterest if excessive familiarity or predictability breeds habituation and boredom or disengagement if excessive uncertainty or unmitigable randomness becomes overwhelming rather than energizing.

At the same time, curiosity-focused design requires more than simply igniting and sustaining the motivation to inquire and explore - it also means providing the support and the tools to do so effectively. We focus here on *questions* as a specific tool that can let players express and potentially satisfy their curiosity. Through question asking, game players can make knowledge gaps concrete, voice their uncertainty (thereby creating social norms of uncertainty in multiplayer settings), and ultimately reduce uncertainty through developing and deploying "good" questions.

In this chapter, we aim to articulate the complex relationships between curiosity, uncertainty, failure, and questions through a design model of curiosity. We demonstrate this design model through description of design work on our curiosity tabletop game, *Outbreak*. *Outbreak* is an asymmetric, cooperative board game for two to five players. Together, players must explore a rogue scientist's laboratory to find the antidote to a dangerous disease. One player takes the role

of a robot, who can explore dangerous spaces within the laboratory. The rest of the players, in their role as scientific investigators, must question the robot to discover what challenges stand between them and the antidote, collaboratively develop hypotheses about overcoming those challenges, and manage limited resources in executing their plans.

In *Outbreak*, we operationalize curiosity through two specific curiosity elements: (1) *comfort with uncertainty* which relates to players' perceptions of failure, their comfort and willingness to take risks, and their search for unanswered questions and (2) *comfort with questions* which relates to players' perceived abilities to fill a knowledge gap and cope with uncertainty, their persistence towards understanding, and their assessment of their own knowledge states. We detail a three month period of playtesting in both lab and field settings, discerning player responses to these curiosity goals through both observational and self-report measures deployed during these sessions. In our analysis of this data, we centered on two key themes: (1) shifting players' orientation toward failure as a challenge rather than a threat and (2) developing effective question formulation skills in curiosity-driven exploration. We then link these emotional and behavioral outcomes to specific design decisions and game mechanics related to curiosity and detail our iterative game design process. We close by presenting a set of implications and general considerations for curiosity-oriented design.

3.1 Building a Design Model of Curiosity and Uncertainty

When creating games, game designers have limited control over player experience. They can produce rules, game systems, resources, narrative elements, and audio-visual assets. However, they cannot directly control player experience, and have limited control over player behavior. Game design theories, such as the MDA model (Hunicke et al. 2004), acknowledge this limitation. Designers can create systems of game mechanics, but they must predict both the dynamic behaviors that emerge from those mechanics when players interact with them, and the aesthetic experiences that players will have as a result. This model suggests a design challenge in creating games for curiosity. Curiosity is a player experience that can be *provoked* by game

elements and *expressed* during play, but not directly manipulated by game designers. Creating games for curiosity therefore means developing a design model of the relationship between curiosity and uncertainty, and exploring how that relationship is mediated by specific elements that can be instantiated in gameplay.

Building on the literature reviewed above, we understand curiosity and uncertainty as existing in a dynamic system (Thelen & Smith 1996) with their interaction mediated by players' comfort with the risk of failure as well as their comfort and proficiency with questions. Figure 1 illustrates the working model of the cyclical interrelationships between these elements that guided this chapter.

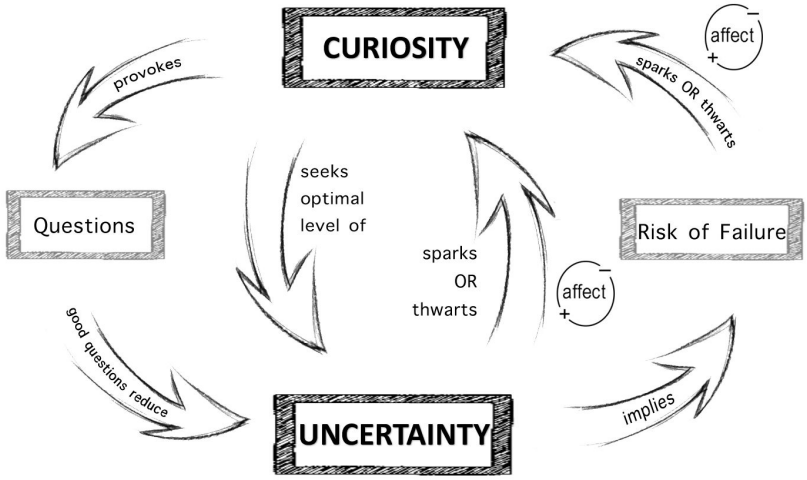

Figure 3.1: Uncertainty and curiosity have a cyclical relationship that is mediated by the risk of failure as well as by questions.

This model proposes that in order to spark and sustain players' curiosity and increase engagement and exploration, designers should strive to:

(1) Present players with a level of uncertainty that is "optimal" - that is, a level that is experienced as challenging rather than overwhelming

(2) Provide players with opportunities, in facing uncertainty, to fail in their attempts to reduce information gaps, and to perceive failures as energizing rather than threatening

(3) Equip players with the ability to ask questions, and to increase their proficiency with question-asking, in the pursuit of resolving uncertainty

In this way, the right-hand side of the model can be thought of as a "growth" cycle between curiosity, uncertainty, and failure. If curiosity is triggered by a manageable level of uncertainty and players construe failure as a challenge, both uncertainty and failure are more likely to elicit positive affective responses and spark higher levels of curiosity. The left-hand side of the model represents a "reduction" cycle between curiosity, uncertainty, and questions. Curiosity motivates inquiry, and good questions ideally (but not inevitably) reduce levels of uncertainty. In both of these cycles, designers must help ensure player comfort (e.g., comfort with the expression of uncertainty, the possibility of failure, and the process of formulating and posing questions) to sustain engagement and, at the same time, prevent player complacency (e.g., by helping players to manage but not fully remove the risk of failure and reduce but not fully resolve uncertainty).

This model provided us with a set of guidelines and goals for our design of the game *Outbreak*: creating an overall level of uncertainty that would be experienced as challenging rather than overwhelming, helping players experience failure as energizing, and increase player proficiency with question-asking. The following sections describe how the iterative design and testing of the game were informed by this model and reveal the design lessons and implications that emerged in the process.

3.2 Outbreak Game Design and Development

The "Sensing Curiosity in Play and Responding" (SCIPR) project aims to design and study game-based interventions for encouraging curiosity through play, particularly for marginalized students who may benefit from increased comfort with curiosity (e.g., female science students, racial minorities). These games are targeted toward middle school (9-14 year old) students. As a part of the SCIPR project, we have iteratively designed and prototyped several games. This chapter focuses on one of those games, *Outbreak* (Figure 2). We use tandem transformational

game design which emphasizes iterating game designs alongside theoretical understanding of transformational goals - in our case, our design model of curiosity (To et al., 2016b).

Outbreak is a cooperative question-asking game for two to five players, in which the group must save a town from a rogue scientist by searching their laboratory for antidotes to a disease. Most players assume the role of scientific investigators, while one player takes the role of their robot assistant. Each investigator player receives a set of resource cards (e.g. characters or pieces of equipment) that include different skills (Figure 2D), such as strength, computer hacking, and friendliness (Figure 2C). Each time they enter a new room in the mad scientist's lair, the robot player can enter first and safely investigate the room. However, the robot cannot describe what they see. They can only respond to questions put forward in the *question-asking phase* by the investigator players, who then select which resource cards will neutralize the threats inside and unlock the antidotes for that room.

On a given round, the robot player reads the back of a room card, which includes a description of the room and lists the skills needed to survive (Figure 2A). Because the robot player portrays a "sensing" robot, they cannot read out the card description. They can only answer questions posed by the other players. Investigator players have limited time during the question-asking phase to ask questions, following which they enter the *discussion phase* where they collaboratively either choose which cards to risk in that room or may choose to pass the room. If they choose a successful combination of cards, they keep their cards and roll to receive antidote tokens. If they fail, they must discard their cards. If they choose to pass on the room, they keep their cards, but the countdown to the end of the game continues.

Figure 3.2: *Outbreak* game with components from V9 including (A) room cards, (B) the game board, (C) the list of skills, and (D) resource cards.

Outbreak, to date, has gone through 12 iterations. In this chapter we discuss versions five, eight, and nine (V5, V8, V9) of *Outbreak*, all of which were studied with players from our target demographic, and which reflect major shifts in both our playtesting and design. Between V5 and V8, we moved from playtesting in the lab to playtesting in the field and adjusted affective elements of the game; between V8 and V9, we changed the question-asking system and added new data collection measures. We discuss these choices further in the next section of this chapter.

3.3 Methods

This chapter reports on the iterative design and playtesting process for *Outbreak*. Over the span of four months we playtested V5, V8, and V9 with participants in our target age demographic, 9-14 years old. Other versions of the game were playtested with players outside our target audience (e.g. for game balance) and are not reported in this analysis. We conducted two playtests of V5 in a controlled lab setting, referred to as the lab playtests ("Lab"). We conducted ten field playtests with versions eight (V8) and version nine (V9) at two local summer programs in Pittsburgh, PA, referred to as the field playtests. Site one was a local science center ("SC")

and site two was a YMCA in a primarily black, low-SES neighborhood ("YMCA"). See Table 1 for playtest details and codes.

Our playtesting process included 1) development of tools to measure players' responses, 2) deployment of those measures, and 3) analyzing their responses. We focused our analysis on understanding players' affective responses, particularly around uncertainty and failure, and on their ability to ask questions.

Group ID	Site	Game Version	Group ID	Site	Game Version
L1, L2	Lab	V5	Y2a, Y2b	YMCA	V9
Y1a, Y1b	YMCA	V8	Y3a, Y3b	YMCA	V9
S1a, S1b	SC	V8	S3a, S3b	SC	V9

Table 3.1: Group IDs for the *Outbreak* playtest groups. Each ID represents a single group of 3-4 players. With the exception of the lab studies, groups with the same number were played on the same date.

3.3.1 Measure Development

In addition to regular playtesting practices (e.g., observing player behavior, focus group interviews about player experience) we set out to measure player experiences related to *Outbreak*'s transformational goals. We adapted best-practice methods from related fields when a validated measure did not yet exist, and then iterate those measures based on usability observations in the field.

In lab playtests of V5 and field playtests of V8, we collected player affective data using the Feelings Wheel (Kelley 2016). The Feelings Wheel includes six core emotions in the center of the diagram, and expands each outward into more specific emotions for a total of 77 feelings (see Figure 3A). To adapt this measure to our audience, we removed the emotion "sexy" as it was deemed inappropriate and uninformative. By circling emotions, players could capture how they

felt during the game even if they did not have the language to generate emotion words on their own.

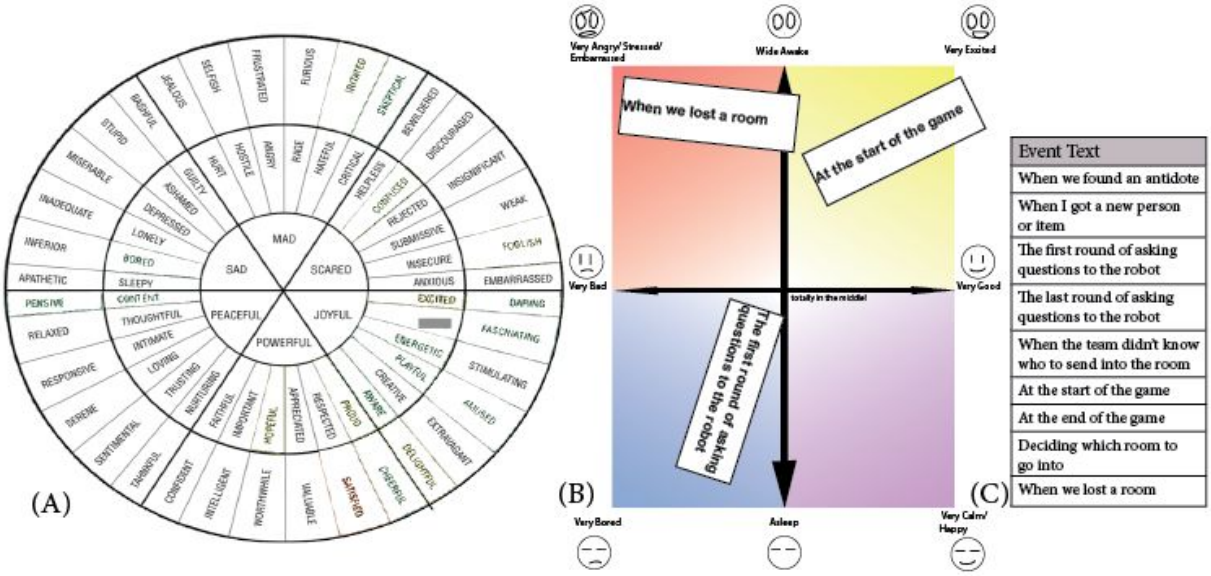

Figure 3.3: (A) The Feelings Wheel where participants circle distinct emotions felt (B) The valence-arousal map with sample event slips that participants place as a marker for emotions felt (C) List of game events used for *Outbreak*

For V9, we developed a version of a valence-arousal map for children's emotion self-report. Our goal was to connect player emotional reactions to specific elements of gameplay. To accomplish this, we combined emotion valence mapping diagrams (Barrett, 2004) and design-based post-it clustering activities (Hanington & Martin, 2012). These cross-disciplinary tools both seek to capture and describe the user's self-reported spectrum of emotion with as much granularity and detail as possible. The map asks players to place prompts related to game moments (see Figure 3C) on a quadrant (see Figure 3B). The instrument was validated through multiple rounds of expert heuristic evaluation by cognitive psychologists and designers, and tested for usability in the field with children.

Game events were selected for their relationship to curiosity, uncertainty, failure, and question-asking. We coded each event for different types of curiosity (e.g., conceptual curiosity),

different types of uncertainty (e.g., hidden information), game outcomes (e.g., failure/negative events), and when in the game we expect events to occur (e.g., early in the game).

Valence-arousal results were coded based on the x,y coordinate of the top left corner of each slip and the quadrant or quadrant boundary where it was placed. We also captured the relative horizontal and vertical placement on the graph in comparison to the other game events, using a ranking of 1-9. Slips that were placed on top of one another were given the same ranking.

We developed a field notes template for our playtest observations, both to standardize data capture across members of the research team and to ensure we captured relevant data. In our field playtests, we were unable to record video due to the limitations of the spaces available, in which children who had not consented to being videotaped were regularly present. We therefore manually captured the questions that investigators asked the robot player during the question-asking phase. Researchers were also directed to capture visible emotional responses to the game, unusual player behavior, and the gist of side conversations between players. When possible, researchers noted the game outcome, whether players succeeded in a particular room, and other observations related to playability and balance.

We coded the questions based on their form and content. A codebook was developed through a bottom-up analytic process led by researchers who had not participated in the design of the game. For example, questions were coded “skill word” if players directly asked about a word from the skill sheet (e.g., “Is it strong?”), “discovery” if they asked about the existence or something in the room (e.g., “Are there any computers?”), and “building off” if they ask a question that builds on information received within the round (e.g., “Are there zombies?”, “Are the zombies friendly?”). Questions could have multiple codes and every question was coded as “concrete” or “abstract”. Questions coded as concrete were ones that cited specific concepts or seemed to represent a specific hypothesis (e.g., “is there a zombie?”, “is it dark?”) whereas questions coded as abstract asked for non-specific information or closely referenced the skill words without a supporting hypothesis (e.g., “is there a threat?”, “do I need to fix something?”). After the codebook was complete, two researchers independently coded the questions and discussed diverging codes until they reached agreement. Additionally, we captured the group and

gameplay round associated with each question. In some cases, we were able to use this data to code whether questions were asked during rounds that succeeded or failed, and whether players had won or lost the prior round.

3.3.2 Playtesting and Measure Deployment

In all playtests, participants played *Outbreak* in groups of three to five, with a researcher taking the role of the robot player. In L1 and L2, players did not know each other before the playtest. To create familiarity between players, both groups were asked to participate in an icebreaker game (To et al., 2016c) before playing *Outbreak*. In the field playtests, which were conducted in the context of ongoing summer programs, players were typically familiar with one another, so no icebreaker was used. Players were randomly assigned to groups and playtests were scheduled as part of the regular activities of the program.

Participants were introduced to *Outbreak* as a cooperative board game currently in progress, and that their early feedback would help the game designers improve the game. The designers were implied to not be present in the room in order to get as honest feedback as possible. Next, one researcher reviewed the rules with the players and played a scripted practice round that included a diverse set of sample questions. The same researcher adopted the role of the robot player for the remainder of the game. The researcher would answer questions about game mechanics if players explicitly asked or if they could not proceed with gameplay. Participants played until they won, they lost, or 40 minutes had passed.

After gameplay, we collected emotion data. For the V5 and V8 playtests, each player was given a paper copy of the Feelings Wheel and asked to circle every emotion they had felt during play. The research team then collected the papers for analysis. For the V9 playtests, the researchers demonstrated how to place an event on the emotion map in a way that corresponded to a feeling. Participants were then given the nine event tokens. They were asked to place each token on a spot on the map that corresponded to their feelings at that point in the game. When participants indicated they were done placing tokens, the researchers photographed the map. If participants

did not place any tokens, they were asked a second time if they wanted to complete the measure. If not, the researchers photographed an empty map.

After collecting emotion data players participated in a focus group interview. Participants were told that their feedback would be helpful in aiding the game designers working on the game to iterate the game and make it better. They were asked what they liked most about the game, what they would wish to change about the game, and for any other additional feedback they'd like to share.

During all phases of the playtest, an additional researcher seated in the play space took field notes using the notes template during play, captured feedback during the focus group interview, and made additional observational notes as described in measure development.

It is important to note that our data represents diverse playtests. Some participants played the game only once, while some played multiple times over several weeks; playtests occurred in a range of physical locations from a formal lab setting to a cafeteria in a science center; and players played multiple versions. Given this diversity of data, it would be inappropriate to perform formal statistical analyses. Instead, we demonstrate that much can still be learned about curiosity and game design from diverse aggregate data.

3.4 Designing for Comfort with Failure

3.4.1 Exploring Comfort with Failure Through Design and Data

In order to explore the concept of comfort with failure, we first needed to operationalize failure within the design of *Outbreak*. Based on our rules design and observation of playtests, we identified three types of failure in the game. First, players could fail to find an antidote in a particular room, which we refer to as "room loss" (V5, V8, V9). Second, players could lose resources such as teammates (V5, V8) or gear (V5, V8, V9), which we refer to as "resource loss." Finally, players can lose the game, either by reaching the end of a countdown to midnight (V5) or by reaching the end of the game board (V8, V9) without finding enough antidotes, which

we refer to as "game loss." Room and resource loss occur repeatedly throughout the game. However, game loss can occur only once and reflects players' overall performance.

During lab-based playtests of V5 (L1, L2) and V8 (Y1a, Y1b), we studied players' emotional and social reactions to the design decisions we made around room loss, resource loss, and game loss. Because we did not want to interrupt players between rooms, these playtests relied primarily on observation to understand room and resource loss, which occurred during play. At the end of the game, we collected self-report data on player emotional experience, which reflected their overall experience in the game.

To connect the data more directly to specific types of failure, we collected observational and valence-arousal map data from four playtests of V9 across two separate sessions at the YMCA site. During the first session, we observed two games involving eight students (Y2a, Y2b). A week later, we observed two games involving ten students, seven of whom had participated in the previous session (Y3a, Y3b). All students had previously playtested different games designed by our group in prior sessions. However, because none of the students had played *Outbreak* prior to Y2, we were able to explore how uncertainty and failure were experienced both as first-time players and on a repeated encounter with the game.

3.4.2 Patterns from the Data

In our earliest playtests of Outbreak with participants from the lab playtests, we observed that failure was a salient concept to the students. Individual player's emotional responses to the threat of failure such as observable anxiety behaviors (e.g., facial expressions, wincing) and vocalized fear over losing often spread to the group, and how the group responded to that - either by amplifying it or dissipating it often had a profound impact on a group norm around failure moving forward in the game.

Failure and Affect

We observed two factors that influenced players' affective relationship to failure. First, we observed that narrative and aesthetic elements had a much stronger effect on players' emotional

reactions to failure than we expected. Second, we observed that repeated play changed players' feelings about failure.

Early in the playtest process, we discovered that players felt attached to the resources in the game, and that they were often more willing to accept room loss (e.g. failure to collect antidotes) than resource loss. For example, in group L2, players asked questions such as "Will we lose the scanner if we send it in?" Although the game's rules prohibit answering the question explicitly, the players decided that their scanner was at risk and chose not to send it into the room. Players correctly identified this decision as one that required weighing a guaranteed failure against the possibility of failure - only by chancing the loss of their scanner could they avoid the guaranteed loss of the room. We observed players experiencing anxiety around this decision, which could affect their willingness to take the risk.

To reduce the level of player anxiety about the risk of failure, we explored the role of narrative and aesthetic factors. Could we change the level of player anxiety using affective manipulations alone? Examining differences between player affective experiences in L1 and L2 suggested that we could. Players in group L1 were visibly distressed during play. Although they claimed in post-game interviews that they enjoyed the game, their Feelings Wheel data corroborated their distress. Of the 37 total emotions circled by four players, 24 were negative; 17 of those fell into the "scared" category, and all four players chose "anxious" to describe their feelings (Table 2). On the other hand, the four players in group L2 circled 49 total emotions, of which 44 were positive. All four players circled "aware" and "confident" to describe their experiences, and no negative emotion was circled by all four players. Our observations confirmed these differences. Players were concerned over the well-being of the game characters and their use of resources; they were sometimes anxious, but never visibly upset.

Group L1				Group L2			
Negative Emotions	**24**	**Positive Emotions**	**13**	**Negative Emotions**	**5**	**Positive Emotions**	**44**
Scared	17	Joyful	9	Scared	4	Joyful	19
Anxious 4				*Anxious 3*		*Aware 4*	
Scared 3				...		*Joyful 3*	
...						...	
Sad	6	Powerful	4	Mad	1	Powerful	15
						Confident 4	
						Faithful 3	
						...	
Mad	1	Peaceful	0	Sad	0	Peaceful	10
						Peaceful 3	
						...	

Table 3.2: Aggregate counts from the lab study groups (L1, L2) Feelings Wheel data. Counts for the two overall categories, positive and negative, are shown, as well as each of the six sub-categories. When three or more participants all circled the same emotion, that emotion is displayed with count data.

What could account for such an extreme difference between L1 and L2, given that the two sessions involved the same version of the game (V5)? During L1, we played a soundtrack of scary music in the background. Players repeatedly mentioned the music during gameplay, and they were visibly unnerved by it. The player response was sufficiently strong that we removed the music during L2 for the well-being of our players. Players in L2 still experienced anxiety, particularly when asked to weigh room loss against resource loss as noted above. However, they appeared to be more resilient to this anxiety, focused less on the negative impacts of their failure, and had more positive feelings at the end of the game.

Another narrative element that affected players' willingness to take risks was the theming of resources. In earlier versions of the game (V5, V8), game resource cards included both scientific tools such as a cloaking device or first aid kit, and scientist characters such as Barbel the anxious ice researcher or Karolina the dependable virologist. Including scientist characters gave us the opportunity to introduce scientist role models who matched our target playtest groups, such as scientists who were female, black, Hispanic, or all three. At the same time, making characters a collective resource, we hoped to create psychological distance between the players and the fate of their characters, who would serve to heighten the drama of the game. Unfortunately, this psychological distancing did not succeed. We observed that the highest levels of anxiety were

associated with negative outcomes for characters. The idea that player choice could result in characters going into a coma was too frightening for our audience. In V9 we removed characters as a separate resource type and saw a reduction in player stress; conversely, if the game were being redesigned for older students, reintroducing threats to scientist characters could increase the level of tension.

Over and above the impact of narrative and aesthetic game elements, we observed that repeated play changed players' affective reactions to in-game failure. As noted earlier, we were able to test the same version of the game (V9) across two different playtest sessions (Y2 and Y3). During these sessions, we collected valence-arousal map data about specific game events, including times when the players failed to complete a room ("When we lost a room" in Table 3). After the second session, players reported affective *dampening*, or a trend toward neutral valence in their emotional reactions, for all game events with one exception - the event involving failure (see Table 3). Players reported feeling more positive about failure events after their second play session, with a decrease in negatively-coded and neutral-coded emotions and a 26.7% increase in positive affect (see Table 3). In other words, playing *Outbreak* a second time reduced emotional responses (i.e., both the high negative and high positive valence) of most game events, but made failure a better experience.

Proportion of Valence/Arousal Responses in Positive/Neutral/Negative Valence

	Positive Valence			Neutral Valence			Negative Valence		
	Y2	Y3	Shift	Y2	Y3	Shift	Y2	Y3	Shift
When we found an antidote	0.714	0.7	(-)	0.143	0.3	(+)	0.143	0	(-)
When I got a new person or item	1	0.7	(-)	0	0.1	(+)	0	0.2	(+)
The first round of asking questions to the robot	0.857	0.6	(-)	0	0.3	(+)	0.143	0.1	(-)
The last round of asking questions to the robot	0.715	0.5	(-)	0.143	0.3	(+)	0.143	0.2	(+)
When the team didn't know who to send into the room	0.572	0.6	(-)	0.143	0.2	(+)	0.286	0.2	(-)
At the start of the game	0.857	0.5	(-)	0	0.3	(+)	0.143	0.2	(+)
At the end of the game	0.714	0.8	(+)	0	0.2	(+)	0.286	0	(-)
Deciding which room to go into	0.572	0.6	(+)	0.143	0.3	(+)	0.286	0.1	(-)
When we lost a room	0.333	0.6	(+)	0.167	0.1	(-)	0.501	0.3	(-)

Table 3.3: Proportion of game events eliciting positive, neutral, or negative (valence) responses on the valence-arousal map measure across two repeated play sessions (Y2 and Y3).

Our prior work in this area emphasized the role of *uncertainty*, as instantiated in game design decisions, in provoking and supporting curiosity (To et al., 2016a). However, this research suggests that *aesthetic* and *contextual* decisions can change players' affect and hence their willingness to take risks. The same game, deployed in different ways (with or without a scary soundtrack, played once or repeatedly), can produce different affective experiences of failure.

Social Factors

Theories of curiosity suggest that social norms about uncertainty and failure will affect people's experiences of curiosity and their likelihood of expressing curiosity. In our playtests, we were able to deploy our game in two different social settings with different social norms: a Science Center and a local YMCA. We observed that social differences between the groups affected how players engaged emotionally and socially with the game. SC players were highly concerned with failure in ways that paralleled the students in our lab studies L1 and L2. We observed anxiety when they were at risk of losing resources. However, these emotions shaped not only their play decisions, but also their social activity during question-asking and discussion. During the question-asking phase of the game, these students spent most of their time thinking silently, presumably about the "right" questions to ask. As a result, they asked very few questions and received little information. With the little information they had, they would debate back and forth endlessly during the discussion phase and would require light prompting to make a decision to move forward. Their concerns over failure were so immense that it prevented them from failing with grace, and from learning. By comparing these students to the players from the YMCA, we can see that this behavior is not purely driven by game design decisions. YMCA students were not overtly concerned about failure or losing resources, particularly by comparison to the SC and lab groups. They tended toward lightweight, short discussion rounds and rapid decision-making, and would forge ahead quickly through many rooms. While both of these behaviors, reflecting and experimenting, are valid curiosity-relevant strategies, we ideally hope to foster both. Games designed for curiosity therefore require designs that are mindful of the social space they exist in. We want to design social spaces that can evoke the curiosity behavior that is most relevant to the goals of a particular curiosity game.

We note that even though social spaces can be designed to support different types of curiosity-relevant norms, differences in emotional response may be amplified by individual player factors. Because *Outbreak* is a cooperative game, players who are working together may experience "emotional contagion," or being affected in their emotional response by the individual emotional response of other players (Barsade 2002). We observed this behavior in group L1, where one player had a particularly strong emotional response to the scary music. While all players found it unnerving, their response was amplified by seeing the fear displayed by this particular player.

3.4.3 Design Lessons

Helping players manage the aversiveness of potential failure can help prevent it from stifling curiosity. In *Outbreak*, we ask players to embrace risk and uncertainty in order to avoid certain failure. We observed that when players were particularly afraid of risk, they chose certain failure rather than the possibility of failure. Fear of failure also sometimes thwarted strategies to reduce the chances of failure, such as when students became so involved in asking the "right" question that they did not ask enough questions to gather information. Understanding that in some circumstances, risk can be more intimidating than the certainty of failure can be used to help design for curiosity in other types of games.

Affective responses to failure can be modified by aesthetic game design decisions. We found that aesthetic design decisions such as narrative and contextual factors had a strong impact on players' affective experience of failure. Scary music, named characters who were at risk, and first-time play all increased the anxiety level in play. Conversely, table talk, generic items, and repeated play all made failure a more positive experience. Finding the right level of difficulty for a game is often conceptualized as requiring game-mechanical balance; our findings suggest that aesthetics can also be used to balance gameplay when it comes to the perceived risk of failure.

Group norms influence the affective experience of failure and the strategies available to manage it. Players' social norms and the setting in which they are playing affect how willing they are to tolerate failure, to take risks, and to express ignorance in front of a group. For example, our SC

and YMCA groups had very different rates of asking questions, even when using the same set of rules. These social norms can be affected by emotion contagion, in which a single player's strong experiences spread to other players. In other types of multiplayer games, designing for players who have outsized or outlier emotions can be a productive way of shifting the norms of the group.

3.5 Designing for Questions

3.5.1 Exploring Question Asking Through Data and Design

To explore this topic, we relied on observational data, valence-arousal map data, and question data from playtests for three different versions of the game in our on-site playtest settings as well as our lab setting.

In every version of the game, each round of gameplay involves the previously described *question-asking phase* where investigators ask questions of the robot player. The question-asking phase is always limited by a timer. Question-asking mechanics varied between versions in two ways. First, in V5 and V8 players could ask an unlimited number of questions during the question-asking phase. In V9 we introduced battery tokens, which constrained both question number and question form. Immediately before each question round, players drew three tokens from a bag. Each token is small rectangular battery with a question template (e.g., "How many _____?", "____ need a ____ ____?") (see Figure 4). In order to ask a question, players turn in a token to the robot player and ask a question matching the template. As discussed below, the robot player needed to use their judgment about how tightly to require the question match the form. Second, we varied how rooms were displayed to invite curiosity. In V5, the rooms were displayed on a board in a map-style layout. In V8 and V9, the rooms were individual cards drawn from a deck. Cards featured a title and some clue words (e.g., the "Big Office" and "Full of broken ____ and a ____ ____"). (see Figure 2A).

Figure 3.4: Battery questions with question templates used in the question-asking phase of *Outbreak* (version nine)

We also use our coded question data to examine the effects of failure on players' question development within a single gameplay session. Questions are coded as either occurring in the first round, or after a round in which they either failed or succeeded at overcoming a chosen room's challenge. We use this information to explore the relationship between prior failures or successes in the game and players' decisions to build on, revise, or discard their hypotheses.

3.5.2 Patterns from the Data

From observational data we see that players had highly varying relationships with questions, specifically regarding their level of comfort. In our early playtests with V5 and V8 in the lab and in the field, players were permitted to ask as many questions as possible within the given time limit. While some players took advantage of this and asked questions in a rapid-fire fashion, we saw some players that asked very few or no questions. These players instead seemed to be deep in thought or too nervous or uncomfortable to ask any questions aloud. In an attempt to ensure that every player had the opportunity and motivation to ask questions, in V9 and beyond we distributed battery tokens so that each player was allotted a particular number of questions they could ask. This limited the questions that the more comfortable students could ask and incentivized the less comfortable students to ask questions.

In V9 of the game, we also implemented the question templates. By asking players to fit their questions to the template, we hoped to support players who were overwhelmed by the task of coming up with a question as well as diversify the questions being asked by players. During game play, we did not strictly enforce that players fit their questions to the template - partly so that students would not feel increased self-consciousness or discomfort with question-asking and

partly because it is logistically difficult for the robot player to check the templates while attempting to answer questions within the timed round. In our analysis of the question data, we examine how closely players matched the given templates when asking questions. In our analysis, only about half of the questions asked perfectly matched the template given. Twelve of the 159 questions across the six game plays used no discernable template at all (i.e., the questions could not be retrofit into any of the existing templates).

The battery tokens are randomly distributed on each round, but we recorded an uneven distribution of usage of the battery token templates across game plays. Of all of the 20 question templates, by far question template Q1, "*Is there a* _____ *?*," was the most frequently used, with 25 uses over the four plays of V9. By comparison, the next most frequent template, Q4, "____ *need* ____ ____*?*," had 19 uses across those game plays. By contrast, Q20 "*When* ___ *a* ____ ____*?*", Q19 "_____ _____ *the most* _____*?*", Q7 "*How much* _____*?*", and Q6 "*Does the room* ____ _____*?*" all had two or fewer uses.

We observed an increase in average number of questions asked from V8 with 24 questions per game to V9 with 33 questions per game. This may be taken as an indication that students' comfort with questions may have increased. However, we must also note that because these data come from repeated game play (albeit with different versions of the game), this pattern may simply have resulted from students' increased level of comfort and familiarity with the game as a whole.

Finally, we observed differences in question-asking behavior and question content when a question-asking round immediately follows a prior failed round versus a prior succeeded round. Removing all first rounds of question asking, we compared post-success and post-failure questions. In post-success rounds of question asking, questions coded as "building off" were three times more frequent than in post-failure rounds. Similarly, questions coded as "characteristic," where players ask about a feature of something they have previously discovered, were three times more likely in post-success rounds than in post-failure rounds. Finally, we observed that questions coded as "discovery" were twice as likely in post-failure rounds. These question-asking patterns indicate that when players succeed, they are more comfortable building

specific hypotheses and learning more about these hypotheses. In post-failure rounds we see more exploratory behavior, with players prioritizing the pursuit of greater breadth rather than greater depth of information.

3.5.3 Design Lessons

Questions can serve multiple simultaneous roles in supporting and expressing curiosity. Questions are a common tool for reducing knowledge gaps, which is why we centered them as a mechanic for *Outbreak*. However, questions also carry with them implicit hypotheses about the gap the players perceive. Even when players cannot articulate their hypotheses explicitly, they voice them in their questions. Because questions are spoken publicly, they help the group perform collective knowledge assessment; players know what other players are uncertain about, and what they think is worth asking. Finally, because answers are also given publicly, questions help players *help each other* reduce information gaps, not just reduce them for themselves. Even in games where questions are not core to the mechanic, creating moments where question-asking is both encouraged and visibly rewarded can create safe social environments to express curiosity.

Empowering quieter players supports the entire group's efforts to express curiosity. Designs that enforce that all players participate support the entire group in expressing curiosity, without impairing the performance of individuals. As we saw in *Outbreak*, when we switched from a free-form question-asking phase to a structured one where each individual player was given battery tokens, we witnessed an increase in the average total number of questions the entire group asked. There was both an increase in fluency and better distribution of question-asking amongst players. In other games that require creative participation, enforced participation might temper the influence of an "alpha player" and help the entire group.

Flexibility in enforcing rules fosters curiosity. When players are trying to reduce a knowledge gap, they are sensitive to their ability to effectively use the tools available to them, including questions. Rejecting attempts to close the knowledge gap for minor rules violations was counterproductive. As we observed in *Outbreak*, the question templates on battery tokens were used loosely. Players typically asked questions that were a close, but not an exact, match. While

the robot player rejected questions that had nothing to do with the proffered template, accepting the close-but-not-quite questions helped support player enthusiasm for and fluency with questions. By not formalizing the degree of acceptable deviance into rules, but rather leaving it up to the player's judgment, robot players can implicitly respond to group social norms.

3.6. Summary

This work explores how game design decisions using uncertainty influence two critical elements of curiosity: the affective experience of failure and question-asking as a method for closing information gaps. In this chapter, I present a design model of curiosity that articulates the relationship between uncertainty and curiosity, and defines the role of failure and question-asking within that relationship. We explored ways to instantiate failure and question-asking within a cooperative board game, playtested repeatedly with players in our target demographic (i.e., middle-school aged students who are underrepresented in STEM), and investigated the impact of game design decisions on their affective experiences of failure and their ability to use questions to close information gaps. We found that affect had a significant experience on players' in-game decisions around risk and failure, as well as on their willingness to express ignorance and take risks socially; players' affective experiences were in some ways more responsive to aesthetic, narrative, and contextual factors than to changes in mechanics. Conversely, changes in game mechanics changed how groups managed their question-asking process, and served to empower quieter players without silencing bolder ones - but flexibility in enforcing the rules and mechanics of the game was key. Designing for curiosity involves a balancing act; when designers can create motivating moments of uncertainty, give players opportunities to face that uncertainty, and equip them with the right tools to resolve that uncertainty they can create positive cycles not only of curiosity but of rich engagement with their games.

This work demonstrates that we can design with uncertainty in mind and provide tools within the design to empower people to reduce their uncertainty. In the STEM context, vulnerable and underrepresented groups may especially benefit from increased feelings of competence

addressing and reducing their uncertainty. This framing particularly focuses on the intrapersonal - how we might address and change how individuals view their own belonging and competence in order to address how they respond to uncertainty. In the next chapter I explore a much broader context for uncertainty that additionally shifts to an interpersonal context - everyday experiences with racism. What is the role of uncertainty in experiences with racism? How does social support help people cope with racism? How might we use a framing of uncertainty to better understand and support that coping process?

Chapter 4: “They Just Don't Get It”: Towards Social Technologies for Coping with Interpersonal Racism

In this chapter I present findings from interviews with people who have experienced racism centered on social support seeking and receiving following racist experiences. This work is published at CSCW 2020 and is done in collaboration with Wenxia Sweeney, Jessica Hammer, and Geoff Kaufman.

4.1. Introduction and Motivation

“*So I appreciate her for trying to help me, but I was like... yeah she just don't really get it.*'” -P02

The previous chapter explores a context of marginalization where we could design for empowerment through an intrapersonal shift in comfort and response to uncertainty. This chapter explores whether and how uncertainty manifests in broader experiences of interpersonal racism.

Racism continues to be a devastating social problem experienced on a persistent basis by people from racial minority groups, which currently make up more than 35 percent of the United States population. Experiences with racism, which are either overtly or subtly embedded in many everyday social contexts and interactions, profoundly affect individuals’ physical, mental, and emotional well-being (Essed 1991). For example, amongst a host of other destructive outcomes, these experiences can, in their immediate aftermath, cause overwhelming cognitive load and anxiety (Croizet et al. 2004) and, in the long-term, impair belonging and advancement in professional and academic environments (Woodcock et al. 2012, Beasley & Fischer 2012) and contribute to decrements to heart health (Calvin et al. 2003). Despite the serious consequences of dealing with racism, a lack of research focus on the unique experiences of racial minorities has been a specific point of critique within HCI and CSCW (Hankerson et al. 2016). As of a 2016 review, an ACM digital library search for the term `racism' only returned six results (Hankerson et al. 2016). While we find it encouraging that as of today (October 2019) that number has more than tripled, we as a field have still only scratched the surface. There is a

rapidly growing conversation that calls attention to the pervasive racism in technology (Benjamin 2019; Noble 2018; Ogbonnaya-Ogburu et al. 2020) as well as calls for incorporating frames of justice and equity into HCI research work (Asad 2019; Ogbonnaya-Ogburu et al. 2020). We embrace the call to action from the paper “Does Technology Have Race?" (Hankerson et al. 2016) which asks HCI researchers to acknowledge the racial bias and inequality often built into our technology, and asserts that there is a moral and ethical imperative for HCI to address bias and push for inclusive design.

At the same time, there is a strong foundation of research within HCI, and CSCW in particular, that has investigated the complexities entailed with processing and communicating experiences related to marginalized or stigmatized identities. This work has revealed that social platforms, both private and public, are frequently used to cope with and navigate the disclosure of unpleasant and even traumatic personal experiences. Social support and coping have been studied through lenses of gender identity (e.g., Haimson et al. 2015), queer identity (e.g., Carrasco & Kerne 2018), and through perspectives on mental and physical health (e.g., Adams et al. 2014). Social support has also been proposed as a key coping mechanism for dealing with racism. However, experiences with racism and racial identity have been historically understudied (Hankerson et al. 2016) and people of color have been historically erased from computing histories (Nelsen 2019).

This chapter aims to shed light on whether and how uncertainty manifests in experiencing and coping with racism. With an eye toward understanding how CSCW researchers and designers could best support members of marginalized groups to make sense of and to seek support for experiences with racism, this work specifically examines current sense-making and support-seeking practices exhibited by targets of racism as a form of socially reducing uncertainty. This work additionally identifies core needs and barriers that future socio-technical interventions could potentially address. What factors affect targets' choice to communicate those experiences in the first place? How do targets decide with whom and through what medium to communicate and seek support in order to address and reduce uncertainty? How do targets of

racism consider risks and benefits associated with specific social technologies when seeking support?

In the Coping After Racist Experiences (CARE) project, we aim to understand the complexities and nuances involved in seeking social support towards uncertainty reduction for experiences with racism. The CARE project builds on HCI and CSCW literature on social support in online contexts by examining the specific needs of those targeted by racism. Our long-term goal is to identify how the design of CSCW tools and methods might help support coping and processing. However, it is first necessary to investigate the existing communication norms and barriers in seeking social support following racist experiences.

This work represents an early step in understanding support-seeking and sense-making needs that experiences with racism trigger. We conducted a qualitative study that explored people's experiences of racism, their approach to coping with it, as well as the extent and the means by which computing platforms served to create a space for these conversations to occur. We focus on two questions:

> RQ1. After experiencing racism, how do targets of racism reduce uncertainty through social means?
>
> RQ2. What opportunities and barriers do current communication and social technologies provide in terms of social support related to racism?

In the study, we conducted narrative episode interviews (i.e., a person-centric method that allows participants to freely share their experiences (Bates 2004)) followed by semi-structured interviews. We used these methods in order to empower participants in sharing their stories of experiencing racism and in guiding our discussion of their practices and processes following racist experiences.

It is important to recognize that while the present study focuses largely on subtle, “everyday” forms of prejudice, racism can and does continue to take the form of extreme, overt acts of violence and trauma. Racism also exists in large-scale systemic and institutional injustice. These forms of racism likely have vastly different social support needs (e.g., community organizing

such as activism, campaigning, and protest (Hyers, 2007), group and individual therapy (Laszloffy & Hardy 2000), etc.). These methods fall beyond our scope, but we acknowledge that there are many important and differing components to the overall process of coping with racism.

Our findings center on the motivation behind support-seeking and means by which support-seekers utilize and curate social systems. We found uncertainty was the biggest motivator for support-seeking behavior. We discuss how targets use social processes to reduce uncertainty as a form of coping with and processing racist experiences. Finally, we see that targets of racism engage in a cyclical process of finding and curating trusted communities and individuals (people who "get it") with whom to share their experiences in the future. We explore implications and considerations for how targets of racism determine who "gets it," the experience of sharing, and trust and agency considerations in using and designing sociotechnical platforms for support-seeking. Our approach to promoting digital wellbeing online focuses on empowering marginalized people by amplifying and supporting their existing best practices in coping with racist trauma (To 2019a). Our desire is that this work contributes to the growing body of anti-racist HCI research and design work.

4.2 Methods

To answer our first research question (After experiencing racism, what social support-seeking behaviors do targets engage in?), we conducted narrative episode interviews with 14 people who self-identified as having experienced racism. To answer our second research question (What opportunities and barriers do communication and social technologies provide in terms of social support related to racism?), we conducted semi-structured interviews about their relationships with various communication and social technologies. Below we detail our recruitment and study procedures, as well as ethical considerations in planning and performing this research work.

4.2.1 Recruitment

Participants were recruited via flyers and advertisements across Pittsburgh, PA, USA and through social media posts on various online platforms such as Reddit, Twitter, Facebook, and large text message groups. Recruitment materials specified that the study would involve sharing personal experiences with racism in interpersonal interactions, and that eligible participants were required to be 18 years or older and capable of completing all study measures (interviews and survey) in English. Participants were compensated ($15 cash or Amazon gift card) for taking part in the study. Respondents to our ads were then invited via email to sign up for an hour-long Skype or in-person interview with the researchers.

4.2.2 Participants

As called for in the paper on "Intersectional HCI" (Schlesinger et al. 2017) we report demographic data that likely impact our participants' lived experiences relevant to our findings (Table 4.1). Our sample (n=14) included 9 Black or African American participants, 4 Asian or Asian American participants, and 1 Hispanic or Latinx participant (listed by self-identified racial identity in Table 4.1). Their ages ranged between 18 and 45 (average = 29). All participants received or were currently pursuing Bachelor's degrees. The respondents were primary residents of Pittsburgh, PA - a mid-sized U.S. city. Three of these interviews were conducted online while the rest were conducted in person.

4.2.3 Study Procedure

The study (conducted in April 2018) consisted of an hour-long, audio-recorded interview about the participants' experience(s) with interpersonal racism, followed by a survey questionnaire on ethnic-racial identity and usage of social media and communication technologies.

ID[1]	Racial-Ethnic Group	Age	Gender	Highest Degree	MEIM EI	MEIM OGO	MEIM Overall	Interview Location[2]
P02	Black	26	Male	Master's Degree	4.20	4.43	4.33	In-Person
P05	Black/African-American	30	Female	Master's Degree	4.20	4.57	4.42	In-Person
P09	African American	28	Female	Master's Degree	3.60	4.14	3.92	Online
P10	Black	32	Female	Bachelor's Degree	4.40	4.14	4.25	In-Person
P11	Black	18	Female	High School/GED	5.00	5.00	5.00	In-Person
P12	Black/African-American/Afro-Caribbean	22	Female	Bachelor's Degree	4.80	5.00	4.92	In-Person
P14	African American	25	Female	Professional or Doctoral Degree	4.80	5.00	4.92	In-Person
P15	Black Hispanic	38	Female	Bachelor's Degree	4.40	4.86	4.67	Online
P17	Latino	27	Male	Master's Degree	4.40	5.00	4.75	In-Person
P20	Chinese	30	Male	Master's Degree	4.20	4.00	4.08	In-Person
P21	Korean	33	Female	Bachelor's Degree	3.40	3.71	3.58	In-Person
P22	Asian American	22	Female	Some College	4.40	4.43	4.42	In-Person
P23	Black	32	Female	Master's Degree	3.80	4.43	4.17	In-Person
P24	Korean	45	Male	Master's Degree	4.60	4.86	4.75	Online

[1] To maintain anonymity, respondents to our ads were all given unique IDs. Due to scheduling constraints, not all respondents participated, and thus our numbering is not consecutive.
[2] Due to circumstances of some participants, interviews were conducted either online or in-person.

Table 4.1: Participant demographic data and results of Multigroup Ethnic Identity Measure (MEIM) including ethnic identity (EI), other-group orientation (OGO), and overall score.

We acknowledge that discussing personal stories of experienced racism could be challenging for participants as it involves highly vulnerable self-disclosure and recollection of bad or traumatic memories. We addressed this concern in several ways. First, a narrative episode and semi-structured interview methods were used to give participants agency and control over the conversation. This was important given the sensitivity of the topic discussed. Second, the researcher directly acknowledged the risks with potential participants throughout the research process. Third, the interviewer (first author) disclosed her personal relationships to the topic at hand (e.g., that she has herself experienced racism, but that she has likely not experienced all of the same forms of racism as the participants, and that she has studied and done work on racial justice for many years). More details on how we addressed the sensitive nature of the current research have been discussed elsewhere (To 2019b).

Upon arrival, the participants were briefly introduced to the study and the researchers and signed a consent form. The interviews began with a short introduction of the participant about their

profession/education, their interests, and their racial/ethnic identity. Participants were asked about the role race and/or ethnicity plays in their life, how often they discuss race with others, and in what context.

Next, participants were asked to communicate one or more narrative episodes (i.e., (Bates 2004)) about an experience with interpersonal racism. The participants were asked to describe the incident that they had experienced, preferably within the past 5 years, giving an anonymized description of the setting, time, aggressor(s), etc. Participants were asked how they responded to the incident, who if anyone they talked to about the incident, how they chose whom to talk to, and how they reached out. They were asked what the impact of this support-seeking interaction as well as the long-term impact of the original incident (e.g., did the incident change their perception of race?). They also answered questions about their general usage of social media and communication tools.

Following the interview, participants completed surveys consisting of three sections: 1) demographic information, 2) racial-ethnic identity, and 3) social media and communication technology usage. The racial-ethnic identity was measured with the Multigroup Ethnic Identity Measure (MEIM), a 12-item instrument widely used in ethnic identity literature to assess affiliation with one's ethnic group, and one additional question to understand the ethnic salience for participants (Phinney 1992, Ponterotto 2003). Participants respond to a series of statements on a 5-point Likert (1 - Strongly Disagree, 2 - Disagree, 3 - Neither Agree Nor Disagree, 4 - Agree, 5 - Strongly Agree) where higher scores are associated with stronger affiliation to racial-ethnic identity. The MEIM provides a perspective on how individuals' feelings towards their racial-ethnic identity interplay with their experiences with racism and their post-incident social support-seeking strategies. Results are reported in Table 1. The last part of the survey included five questions on types of social media and communication tools participants use, the frequency with which they use them, and where they feel comfortable discussing ethnicity/race-related issues. These questions were investigated to inform our next step of designing digital tools that amplify social support for targets of racism at online environments. Results replicate what is found in the interview data and are not reported separately in this

chapter. After the completion of the questionnaire, participants were thanked by the researchers and received $15 cash or gift card as compensation for their time.

4.2.4 Reflexive Statement on Researchers

All researchers conducting the interviews and qualitatively coding data identified as women of color, entailing some personal stakes in this research topic for the researchers. Not only does this mean that both interviewing and analyzing researchers personally identified with the research, but it also means that the researchers had their own experiences and opinions about racism and racialized aggression.

While this may seem to pose a risk of subjectivity and bias in the study, it was also conducive to the study since participants feel more comfortable discussing these issues with someone who "gets it." To help signal this directly to participants, during the session the interviewer (lead researcher, myself) discussed experiences with participants as a peer while acknowledging that participant have unique experiences our research team members likely do not have. The interviewer took particular care to avoid responses that could be experienced as micro-invalidations by stating at least twice during the interview (once before the narrative episode and once before the semi-structured interview) that questions were not meant to invalidate the participant's lived experiences, but instead meant to clarify so that the interviewer avoided over-interpreting what the participant said. The interviewer also regularly affirmed the participants' personal stories.

4.3 Analysis

We use qualitative methodology as it is ideal for situations where the phenomenon at play is unclear (Birks & Mills 2015). We recorded and later transcribed all of the interviews. A blind study protocol was used for analysis (Salkind 2010). In other words, except for the lead researcher who supervised the entire project, data analysis was conducted by a different subset of researchers than those who assisted in conducting the interviews. We utilized a grounded theory

approach to qualitatively code transcripts of our interview data with several rounds each of open, axial, and selective coding (e.g., Creswell & Creswell 2017).

During open coding the first author reviewed transcripts by going line-by-line and highlighting and writing down phrases, words, and actions with an emphasis but not exclusive focus on social support-seeking forms of coping. The lead researcher and an additional researcher then selected portions of the data to iteratively code with open codes, using points of disagreement to refine the code definitions. The final codebook contained 27 open codes. Open coding produced 684 quotations with one or more associated codes each.

To develop axial codes, the research team explored relationships between quotations sharing the same open codes and classified identifiable relationships under an axial code.

When axial coding was complete, the lead researcher performed selective coding. During this process, relationships were drawn between axial codes to make meaning from the data. The results of selective coding are presented in the discussion.

4.4 Findings

"*Yeah it's like... that's the situation where it's like so aggressive that people like me on the periphery and get it... like we have no choice but to get involved.*" -P24

In this section we describe findings about the experiences of racism our participants shared and their processes of communicating about those experiences. Due to the richness of the stories they shared, we begin by providing a summary of our participants' experiences with racism followed by a few illustrative sample stories (4.4.1). We then describe the processes targets of racism engage in when seeking social support including what social technologies they use, what they choose to share, and what factors go into their decision-making (4.4.2). Next we describe the core motivation for that support-seeking behavior - uncertainty (4.4.2). Finally, we describe *how* social support helps targets of racism cope through meaning-making (4.4.2).

4.4.1 Experiencing Racism

In order to provide the necessary context to understand social support and coping, we provide a brief summary of the experiences our participants shared with us as well as three representative stories. While our analysis focuses more on the coping process, in this section, we do discuss important common themes across how participants describe these experiences. *We caution that these stories may be triggering and upsetting to our readers.*

Summary of Stories

In total our 14 participants shared 52 discrete stories with us about their experiences of racism. We count `discrete stories' as experiences with either precise incidents or perpetrators identified. For example, saying "*my high school math teacher said he was surprised I was so articulate*" is a discrete story, but "*people make comments about how good my English is*" is not a discrete story, but is still included in our analysis. The stories ranged in both practical and perceived intensity for our participants. To name a few we heard stories about microaggressions in a science lab workplace, experiences being followed by security while shopping, stories including hate speech, physical violence, and the threat of violent confrontation and arrest by law enforcement.

In our description of the narrative episode, we asked participants about their personal experiences with racism. However, we found that participants had varying definitions of what it means to describe `their personal experience' with racism. We coded the stories by the target of racism and found that of the 52 stories, the participant was the direct and sole target of the racist experience in 18 of them. In 12 of the shared stories, the participant described experiencing the racism with someone else (e.g., Story 1 below where P05 was with her cousin the entire time). In six of the stories, there was no direct target of racism. In other words, something racist happened in the vicinity of the participant (e.g., seeing a Confederate flag flying while driving through a new neighborhood or being an Asian person and overhearing someone say something racist about Black people while no one else who is Black is in the vicinity). While the participant was not `directly targeted' it was still their personal experience with racism, and they often coped with it similarly as they did with experiences where they were directly targeted. Finally and most

surprising, the final six stories describe situations in which another person, known or unknown to the participant, was directly targeted by racism. For example, P12 described her brother's experiences being harassed by the police, P15 described her son's experiences being followed by security guards while walking through a mall, and P24 described intervening when he saw an unhoused person of color being harassed on the street by a group of white men. Even in these 'indirect' experiences of racism, racial minority group members feel the oppressive nature of the racism and often need to engage in some form of processing and coping.

Experiences with racism were often described as embodied by participants-- their emotions were felt physically. One physical characteristic that participants noted during their racist experiences was a feeling that their body was heating up from embarrassment or outrage. Additionally, participants noted having weird feelings that people were looking at them and of wanting to get out of the situation. These embodied feelings also left participants feeling rejected due to a barrier preventing them from belonging.

Another common detail described by our participants is the role of non-verbal support during their experiences with racism. Participants often clearly remember when another person of a similar racial background or other marker of allyship shares meaningful eye contact during the experience. Participants describe those allies in the moment as "getting it" (discussed as an important theme later in this paper). Very often, the participant does not discuss the incident further with these in-the-moment supporters.

Finally, childhood memories were a prevalent part of our participants' storytelling. Of our 14 participants, 10 told us about some incident that happened during childhood. Often these stories stood out in how participants framed their experiences. For most participants, they described how, at the time, they didn't understand that they were being treated differently because of their race. These first brushes with racism are often very clear and cleanly narrativized by the participant-- there is a beginning, middle, and end that the participant describes linearly and concisely. This differs from the other stories which are often told cyclically with participants calling back to a prior story several times throughout the interview to add additional detail.

Representative Story Samples

Here we present three stories that represent the experiences of our participants in more detail. In story one, P05 describes an initially ambiguous experience being unjustifiably removed from the VIP section of a concert venue by security. In story two, P11 describes six of the most common microaggressions she experiences and explains why she chooses not to respond to them, through support-seeking or otherwise. In story three, P17 describes experiencing directed hate speech on a public bus.

Story 1. Part way through a concert in Las Vegas in a VIP section, security tapped P05 and her cousin on the shoulder and asked them to leave. They were given no previous warnings and were very visibly the only two people of color in the section. During and after being escorted out, P05 and her cousin repeatedly asked security and hotel management for specific reasons for their removal or for photo or video documentation. Management repeatedly said, "*we didn't look at the video, but security told us you were a problem*." They then instead asked for a refund and were denied but told they were welcome to purchase tickets and come back to a future show.

P05 later called her father - as she was considering legal action on basis of discrimination and was interested in filing a civil suit. She also told her close friends who she texts daily about this incident. She received mixed responses-- but largely the 'bad' responses came from people who she was not as close with who had known she was going to Vegas. When they asked how the concert was, she described the situation as well as its racial motivation, to which at least two responded "*did you guys do something?*" She was very frustrated by this because she felt that "*sometimes a lot of people can't see that oh wow this actually does happen to people for no reason, it's unprovoked.*" Others commented, "*that sucks*" and "*I can't believe that happened to you guys,*" and "I hope you guys can work something out." She was encouraged by these comments and seemed happier overall with the friends who responded in this way.

While her cousin posted about the event on Facebook, P05 did not. She thinks she commented on his post, but definitely did not engage in any conversation. However, were it to come up, she is willing to tell others who might attend that same venue about her experience to deter them:

> "*I'm not going to necessarily go on a social media tirade against you, but if I can convince or let other people that I personally know about my experience with this hotel... hopefully they will feel the same way and not want to support organizations and business that treat people the way that they treated me.*"

She will also no longer patronize their hotel, mall, or concert venue in the future.

Story 2. Every one of our participants described common microaggressions they experience. P11, an undergraduate student, described six common microaggressions she faces in rapid succession: 1) "*wow, I wish I was as dark as you,*" 2) "*oh, you're so articulate,*" 3) "*you're just playing the race card,*" 4) being told her Nigerian mother or father's accent is "weird," 5) "*can I touch your hair?*" and 6) being called an "Oreo" in middle school (a derogatory term that implies you are 'Black on the outside, but White on the inside'). Over the course of her interview, she described additional microaggressions, but what stood out here is that she was able to so quickly list these experiences. She described a few of her philosophies and responses to dealing with microaggressions:

> "*It's just like we all deal with microaggressions. No, it's really terrible that we all deal with microaggressions but you kind of just have to shrug your shoulders... I don't really experience [overt racism] much anymore other than, like, little microaggressions and I'm just like, oh you're a dumbass and I get over it because I kinda have to, which is terrible... Like most of the time White people don't even know that they're saying microaggressions and if you tell them they'll get really offended and it's very annoying.*"

To P11, microaggressions are inevitable, commonplace, and not worth reacting to. It gives more power to the aggressor to spend her time thinking about what happened, and in the worst case it could backfire on her (e.g., possibility of being fired by her manager for pushing back). This attitude towards microaggressions is shared by the majority of our participants. It is worth noting that this distancing attitude is yet another coping mechanism. However, we know that microaggressions have cumulative negative impacts on those who experience them.

Story 3. P17, a recently graduated grad student, recalled a blatantly racist incident he experienced on the bus. He described his experience as being incredibly hostile in a way that necessitated multiple forms of social support.

P17 used to regularly commute to school by bus. On the day of the incident, he gave up a seat on the bus to an older woman that just boarded. As the bus was crowded, he stood in front of her to hold onto the pole right by the seat. After taking his seat, the woman kept kicking P17's foot, so he asked her if his leg placement was bothering her, and the woman responded that she wanted him to move. He said that he could move his leg, but he would still be close to her as a result of the crowded bus, and she replied by saying that he was not entitled to the space. P17 replied that everyone is entitled to that space if they have a bus pass. The woman launched into an agitated rant about how `Blacks' beg for everything and that they feel entitled to everything they have, but if they are given welfare or education, they still complain. This sharp turn in the conversation shocked and upset him.

This interaction captured the attention of many bus riders close to P17 and the woman. Multiple riders began arguing with the woman, calling out her racism and hate. P17 remembered as he was getting off the bus that the driver, who was an African-American man, said that he was glad he had handled the situation like he did. A Latinx woman who recorded the incident sent the video to P17 and told him she was going to send it to a local news station.

Despite that immediate support, P17 described struggling to process and cope long after the event:

> "*I don't know what happened to [the video] but it was an interesting experience, because up until that point though I had dealt with, you know, the regular run-of-the-mill kind of microaggression being one of four minority students in my whole graduating class. It was never anything so blatant and kind of disgusting that made me really reflect. You know, it really bothered me... so much so, I called my father afterward and I was crying. The reason I was crying wasn't because I was sad, I was so angry because I felt like I should have been able to defend myself. And I felt put in the position where if I defended myself it was only going to react negatively upon me... I felt helpless because I had no response other than just take it.*"

4.4.2 Communicating About Racist Experiences

We break down the core aspects of communicating about experiences of racism into three sub-themes of support seeking: 1) mechanisms and the process of seeking-support, 2) uncertainty

as a motivator and deciding when support is needed, and 3) meaning-making as the purpose of support through uncertainty reduction. In this section, we refer to our interviewees as targets of racism and the people they share their stories with as supporters.

Uncertainty Motivates Support-Seeking

In our data, we observed that two main sources of uncertainty are the major motivators for communicating about experiences of racism. The first uncertainty motivator for communication is uncertainty about the event itself. In situations that were initially ambiguously racist, participants often describe a constant inner dialogue assessing the occurrence. They might, for example, ask themselves: was that racist? Am I overreacting? Was that a slip of the tongue or is that person racist? Should I leave? These inner conversations can be summarized as a desire for a "sanity check" through which targets reaffirm their experiential reality (Sue et al. 2008). Targets of racism also face uncertainty about what to do when deciding if an experience was racist. Should they engage in some follow-up action or confront the aggressor? Should they avoid (if possible) this person or space in the future? What can they do to better protect themselves in the future? In these situations, targets may seek empathy, advice, and connection with others with a shared experience.

The second source of uncertainty motivating support-seeking is uncertainty about the consequence of the event. These consequences may take different forms; the common thread is how seriously they are perceived to affect the target. In the most overt case, racism may present a threat to the immediate and future safety of the target, including the threat of physical violence or harassment. For example, P17 described being approached by police officers with guns drawn while he was parked in his car on the street in the neighborhood he lives in and the constant undercurrent of uncertainty about their reactions if he moved too quickly or spoke too loud or too fast. He further described the lingering impact of uncertainty about *why* he had been approached by the police. For weeks later he described how it weighed on his mind:

> "*There were many times after I picked up my daughter where I waited there to see who drove their car there to look out on the hill. And there were so many times where people did [what I did] and they were of mixed race and mixed nationalities, but no one ever got the cops called on them. So I don't know if it was a lesson learned [by my neighbors] or*

> *something that just was specific to me. I mean I'm six feet, 251 pounds. I don't have the darkest shade of skin, but I do have a dark shade of skin and I don't know.*"

This lingering uncertainty centers on the consequences of staying and living in this neighborhood as a man with his physical appearance. Will this happen again, and is this a safe place for his family? Another form of threat may be to the target's future. When racism occurs in professional or academic contexts, the target may feel that their future opportunities are either already limited or may become limited depending on how they react to the situation. There may also be a threat to the target's sense of social belongingness. The climate of a professional, academic, or public space may become hostile or chilly (Barajas & Pierce 2001, Crawford & MacLeod 1990), negatively impacting long term engagement with entire topics of study and/or communities and snowballing to create long-term impacts to career and professional success. In the case of feeling these serious threats, targets seek social support primarily for emotional support as the experience is often traumatic and secondarily for advice.

To provide one additional example, as described earlier in Story 1, P05 asked her father for support that addressed both uncertainty about the event and potential future consequences:

> "*I talked to my dad about it specifically because I remember being so upset that I was considering legal action on basis of discrimination. I remember going as far as looking into seeing about filing a civil suit because I was that upset and felt that wrong you know? But, at the time I was applying to schools and carrying out a legal situation across state lines is difficult and financial and it just wasn't worth everything else that I was doing at the time to kind of focus my energy on that.*"

P05's father is a legal professional. In asking him whether or not she should consider legal action, she is asking whether or not the situation was racist by a formal definition of discrimination. In addition to this question about the event, she also asked him how long the process would take, what financial impact it might have, and how much of her time it would take. In other words, what are the consequences to my life and what will the outcome be if I respond in this particular way?

In situations where there is more certainty about the event or its consequences, participants did not express the need to seek social support. While their experiences may come up in

conversation during the social norm communication described above, in these situations of certainty, the target does not actively seek support related to the experience. For some, it may feel necessary to downplay the impact of frequent experiences such as microaggressions as a type of coping in and of itself either by labeling them as 'not that bad' or by using humor and sarcasm. If every experience of racism merited a specific action from the target, their life would be overwhelmed with the constant reaction to racism. Ultimately, this is not feasible.

Support-Seeking Processes

Understanding that uncertainty can kick-off the support-seeking process as a form of coping, we can focus on the particular mechanisms targets employ to connect with others and communicate their experiences. We discuss the role of communication technology and social media platforms, particularly as it affects the inclusion and exclusion of particular people in the social coping process.

Participants overwhelmingly distrust more public social media platforms in seeking support for racist experiences (e.g., Facebook News Feed vs. Facebook Private Groups). None of our participants described actively seeking support for a personal experience with racism on public platforms. However, three of our participants said they post about personal experiences only when they can do so in a joking manner. For example, P05 posts about microaggressions on Facebook and Twitter:

> "*I always kind of take it to a joking place. I mentioned something that happened or that I thought was interesting or strange or weird. I may mention it on my Facebook as like a status or Twitter... I feel like some of the craziest things happen to us on a daily basis that I can't help but respond with laughter and sarcasm because it happens so frequently and it's almost like it should be a joke. It really is not a joke. It's real life stuff, but I try not to let those situations take definition in my life."*

Although the purpose was described more to cope through humor, than to generate support, social support may still have come from this interaction. Four of our fourteen participants said they would *never* post a personal story about racism on social media.

Participants' primary concern was how shared personal information might be used against them in the future, particularly regarding prejudice and discrimination. For example, P14 is in school

to become a trial lawyer and described concerns that if she were to express her true opinions about police violence (e.g., Eric Garner's murder) people might assume she is biased and accuse her of letting people off easily in future cases. Many participants were unsure how the platforms might share personal information, how long it might live online, and who ultimately would be able to access it through search mechanisms. There was a general lack of visibility on how personal information lives and travels online.

Six of our participants said that rather than posting personal stories, they post articles relating to race and racism. This allows them to express their political views and even imply to potential readers that they may have had similar experiences (e.g., White people excessively and inappropriately calling the police on Black people in viral social media news stories such as "Barbeque Becky" (Herreria Russo 2018)), but provides more distancing and protection from critique of their personal experiences.

For our participants, the mode of social support communication is incidental. That is to say, support-seekers communicate with potential supporters in line with their already established social norms. If a person speaks on the phone with their parents, they will use a phone call to tell them about their racist experience. They might call specifically to communicate about their experience or they might describe the experience during, for example, a regular weekly phone call with their family. Targets do not usually alter their communication norms when seeking support for racist experiences. We also explicitly and repeatedly asked participants about their choice of communication technology, preference, and reasons for their feelings and were very often met with noncommittal or one-word answers; finding that they do not care or do not actively think about their preferences enough to verbalize those choices.

The only time a target might change the mode to seek support is when the communication is overly burdensome. For example, when P20 was sharing an experience with a friend over GChat (an online instant messaging service), he realized there was too much context and background to explain. He halted the conversation and told his friend that he would "*tell him about it next time I saw him in person*." The burden (physically, modally, emotionally, and/or mentally) of typing the story in pieces was overwhelming and necessitated a change of platform.

Targets also proactively join or curate communities where they feel comfortable discussing their experiences with racism. In these situations, "getting it" is usually a given and therefore targets can openly share experiences with either individuals in the group, or the group at large without the burden of feeling evaluated on a case by case basis. In our interviews, these communities fall into two main categories: 1) professional/institutional organizations and 2) pseudo-anonymous online communities. While the core purpose of these communities may not be social support for racism, it is an expected and acceptable community norm that people self-disclose experiences with racism and often the community will collectively engage in meaning-making with the target. For example, P23 describes her interactions on a large-scale online forum that focuses on Black women's hair care where she has engaged in discussions about racism:

> "*So it really started as, 'we have to learn how to take care of Black hair' and now books have been born from that group, hair care companies have been born from that group. I wasn't there when it started, but it started because we wanted to educate people. It was so much hair care or styling, but then we talked about other things that women talk about. So it is this women's forum where we talk about politics, we talk about entertainment, we talk about... we talk about everything, but you just know that you're talking to Black women.*"

In these situations, even when a supporter introduces uncertainty, the target engages more positively with that uncertainty. When these conversations happen with the entire group, there may not be consensus, but the target can use the multiplicity of opinions and perspectives to come to their own conclusions as an individual as to the nature of their racist experience. Regarding professional organizations in particular, there is a sense that members of a community have a responsibility and a need to uplift and support each other. P02 discussed the communal aspects of a large text message group on GroupMe for young professionals of color in the city of Pittsburgh, PA:

> "*I always tell people even people who are visiting often like Pittsburgh is small, but Black Pittsburgh is even smaller. There's not a lot of us here, so we really have to work together to make things happen, because there are certain places that we're just not welcome and stuff like that. So I think that's why the group is there. Just, you know, just to get people to hang out and network. Some folks more like a network aspect, but every*

> *now and then there's a time where somebody is like... 'you know I just want to hold this up to the group, throw it out to the group and see what happens."*"

While the group centers around a professional affiliation, the purpose and lived use of the group stretches beyond professional networking. People in the group lean on each other for practical, mental, and emotional support.

The social support processes for targets are often cyclical. People who are deemed to be poor supporters (e.g., through introducing uncertainty, invalidating the support-seeker, etc.) are excluded from future communication about racism. These relationships are often tainted in the future with the target always knowing that even if they are close with the purported supporter, they will never really understand or empathize with an important aspect of their lived experiences. This can cause distance that may be visible or invisible to the supporter. Supporters who demonstrate allyship build trust and understanding with the target that gives more leeway in the future to introduce uncertainty during the meaning-making process and may be more readily called upon when future support is needed.

Meaning-Making through Social Support Reduces Uncertainty

An important part of the coping process in dealing with racism is understanding the underlying motivation and purpose behind the interaction. We know from the previous section that uncertainty around the event motivates support-seeking. In this section, we describe both the social and individual processes of meaning-making as a form of coping. In social processes targets look for trusted allies to evaluate their experiences with them. In individual processes, targets often relate their individual experiences to a larger context.

When selecting a potential listener or supporter, the top priority for a target is that the supporter gets it. This concept of "getting it" or "not getting it" was core to every participant's conception of communicating about racism. "Getting it" usually implies that the supporter has a high degree of empathy for the target, either because they shared similar lived experiences or because they have in some way demonstrated that they are a legitimate ally (i.e., a person who has already said or done something in front of me that proves that they will legitimize and understand my lived experiences). For example, P21 describes:

> "*I found that I can only really speak openly about these experiences with people who I feel like are gonna get it and who have also been accused of not being Asian enough or like taking on traits that are not like stereotypically Asian and like you know I don't know betraying the race or whatever the hell like the subtext is you know?*"

It's important to note that this does *not* mean that the supporter always labels the event as racist. "Getting it" is a precursor to support. The support-seeker is not looking for someone who will always say "yes, that was racist," but is instead looking for someone who has a shared frame of reference who can help resolve their uncertainty. A Shared frame of reference supersedes the need for supporters to share the same racial identity or have the same experiences as the target.

Supporters can do a number of things to help a target resolve uncertainty. First is the sanity check-- supporters can just clearly state yes or not that an event was racist or racially motivated. This kind of uncertainty resolution is typically a short interaction and quickly and easily bolsters a target's feeling of validation. Supporters also might help run through different or parallel scenarios with the target, either in theory or in practice. For example, a supporter might return to a store where a friend was followed by a security guard to see if it happens to them. Whether or not the supporter has the same racial identity as the target, both can gain useful information from doing this kind of test.

Second, supporters with certainty might provide additional context or background information, explain why a particular incident might be racist, and engage in a back and forth meaning-making process with the target. For example, P10 described experiencing frequent slights and exclusions from her Indian cohort members. After several experiences with these microaggressions, she reached out to a Pakistani childhood friend asking, "Is it just me? Is my intuition off?" Her friend responded that she was correct in thinking that her cohort members very likely had culturally ingrained racial prejudice towards her, but insisted that she not take it personally and try to ignore their ignorance in future.

Finally, a trusted supporter might bring in a non-threatening level of uncertainty and work with the target to resolve their mutual uncertainty. For example, P15 described that she and a number of her co-workers were uncertain whether or not their more senior co-worker had said something

racist over lunch. They spent the next week going to each other rehashing past statements that had been red flags in retrospect and ultimately came to the collective conclusion that he himself was not overtly racist, but was "a product of another time" and thus they could forgive but not forget his indiscretion.

Whether or not it is a result of independent or social support, an important process a target might go through in coping is the abstraction of the racist experience to its larger context. When our interviewees discussed their experiences, they often focus on the agent of racism on institutions and physical locations rather than individuals. For example, when P23 (who identifies with her Christian religious faith) discussed a racist experience in a Catholic church with an elderly woman, she described how that experiences altered her willingness to enter Catholic churches in the future:

> "*But I guess it affects the churches that I go to even now. I try not to go to Catholic church. But okay, like if I go to a church, a Catholic Church, and there are no Black people in the church I automatically think there is another church for me... I'll stay for today. Today I'm already in church, right? Right. So I stay and if there's no Black people and the people don't seem friendly at all yeah, I won't come back again. I used to think maybe they're just in a bad mood, but now I just don't come back again... However, if I go there and everybody minds their business and there are some Black people there I'm more inclined to visit their church again because again I'm like, okay maybe everyone is just in a bad mood today.*"

We can gather a few things from this story. First, extrapolation to the larger context and distancing might be a useful and productive part of coping - rather than being about me as an individual, my racist experience was evidence that some larger system is flawed. Second, connecting to a larger context might help me make predictions about the future. I can avoid experiencing racism in the future if I can understand why it happened when it did. Finally, we might imagine that time is a key factor in this contextualization process. Our participants are often describing experiences years after they occurred and their bias in feeling comfortable discussing these experiences might mean that they are quite far in the coping and healing process. It might be that contextualization is not an inherent part of processing, but a signal that a target of racism has coped 'well' with the experience.

4.5 Discussion

"*It's just after a while going back [and forth saying] well then they shouldn't do this, they shouldn't do that, it's like alright, you don't get it*." -P12

In the following section, we discuss the risks, challenges, and design opportunities associated with seeking social support and communicating following racist experiences. In particular we focus on the process of determining whether or not to seek support and the experience of sharing, how people determine who to share with, and considerations relevant to trust and agency in the support-seeking process.

4.5.1 Experience of Sharing Racist Events

Social support can be an incredibly useful tool in reducing and mitigating uncertainty and other negative impacts of dealing with racism. However, the act of seeking support can be burdensome, present unique risks, and entail competing priorities. Just deciding whether or not to seek support is a difficult process in and of itself that we can consider in creating social support tools.

Communication needs for support for racism evolve over time. In the time immediately following an incident they strongly prefer synchronous and low-effort forms of communication, and tend to follow known trends for sensitive disclosure on social media sites (e.g., that Instagram may be preferable for sensitive or emotional disclosure over Facebook (Andalibi 2017). Like many forms of trauma, racist experiences have a cyclical lifecycle and may be triggered by proximity to the aggressor, the physical or metaphorical space where the aggression took place, etc. weeks, months, and even years later. While immediate support may be needed, support-seekers need more tools for reflection, long-term unpacking, and documentation, especially for microaggressive racism where the accumulation of events build to create a larger impact (Sue 2010). There is a need for tools that facilitate access to supporters that are available when the support-seeker is ready to share, whether that is immediately after or even during an experience, or days, weeks, or even months and years later.

While their experiences of uncertainty are core to support-seeking, our participants did not acknowledge uncertainty directly when coping with everyday racism. Not acknowledging or possibly even recognizing uncertainty can seriously impact how they might communicate about their experiences. Even without explicitly discussing their uncertainty, stress from uncertainty can be easier to manage if targets seek social support as a means of validation or clarification (Sharma & De Choudhury 2018). However, relatively little is known about how awareness of uncertainty affects support-seekers. Might targets of racism be more effective at support-seeking if they were aware of their own uncertainty? Can using uncertainty as a frame improve alignment between the target and a potential supporter? Would targets develop novel techniques for reducing uncertainty to a more comfortable level? Given the individual's differences that people have for tolerating and coping with uncertainty, we can expect a range of responses and need to thoughtfully incorporate support for those differing levels of comfort.

Our work drawing out uncertainty as a core theme may itself make the targets of racism more aware of what they are experiencing as uncertainty. As researchers, we are philosophically committed to disseminating our insights within the affected community, particularly as multiple members of the research team are directly targeted by racism. We therefore emphasize that uncertainty is a natural and common part of the process of coping with everyday racism. We must incorporate considerations in designing for the experiences before seeking support and while receiving support, not just the outcome of that support.

Finally, people who experience racism need options to signal their values and needs while protecting themselves from direct confrontation. Our finding that participants share news articles rather than personal experiences has interesting parallels to strategies used by queer youth identity work online. Queer youth often share articles about political and social issues to let others identify them as LGBT+ (Carrasco & Kerne 2018) but are often engaging in a delicate dance over how much of their queer identity to signal in online social spaces (DeVito et al. 2018). Racial identity very often comes with visual signals that are difficult to disguise, and we see that sharing articles about others' experiences rather than inviting people to see them as a racial minority, instead invites consumers to understand the poster has experienced racism

similar to that discussed in a given news article. The widespread dissemination of the news stories lended a legitimacy that participants felt would discourage invalidating responses as well as provide psychological distancing from similar negative reactions. Technological affordances such as Facebook's profile photo filters for campaigns such as the Red Equal Sign for marriage equality allow people to communicate their values and needs in an ambient way, but have also been criticized as being 'slacktivism' and shallow virtue-signalling (Penney 2015). This work brings to light how these ambient signals might help support-seekers find potential supporters more easily.

4.5.2 Determining Who "Gets It"

Once a person has decided to engage in the sharing process, they must determine who to seek support from. As discussed in our findings, participants repeatedly describe needing to know whether people "get it" or "don't get it." This desire has implications for the design of online communities as well as other forms of computer-mediated communication.

First, support-seekers need tools to find communities that "get it." Very often the context of an interaction lets a target know that people in the space or community will understand the nuances, complexities, and uncertainties that are embedded in experiences with racism. On college campuses, ethnic minority cultural centers can provide safe havens and countercultural spaces that, among many services, provides a space for unpacking racist experiences (Patton 2010). Online communities such as subreddits can similarly explicitly signal prioritization on creating racial-identity-based community and can enforce that through careful moderation (Dosono & Semaan 2018, Dosono & Semaan 2019). We as technologists and researchers must continue to design for digital spaces that provide ambient signalling of legitimate acceptance and safety to discuss racial issues.

Second, the process of curating a group or community of people who "get it" when it comes to experiencing racism is a long, iterative, and ongoing process. There can be a disconnect between friends and family and a support-seeker when the seeker has unique experiences (e.g., cancer patients (Taylor et al. 1986) which can lead to isolation and feelings of rejection. While this can

urge support-seekers to seek formal organizations, seeking support for racism comes with unique risks ranging from microaggressive invalidation (e.g., being told we live in a post-racial society (Sue 2010) to more serious practical risks (e.g., losing a job, harassment (Debatin et al. 2009)). Knowing that formal support groups and professional organizations are prevalent, support-seekers greatest need is for technological tools that support informal supporter curation and facilitate easy access to supporters. We might compare a message board or Facebook group to Google+'s circles that create a filter that only allows certain trusted members to see certain content and might obfuscate who belongs to which group (Sharma & Cosley, 2015). Support-seekers need to be able to easily move people in and out of circles of trust to provide a higher chance of receiving appropriate, validating, and needed support.

Finally, those unique psychological and practical risks that come with seeking support for racist experiences heightens the need for transparency when it comes to security and privacy in our social tools. For many groups, getting it wrong about who "gets it" can lead to the aforementioned isolation, rejection, and exacerbation of the issue. Related specifically to racism, studies on the framework of color blindness show that many people have a vested interest in protecting themselves from criticism at the expense of the targets of racism and that these individuals often seek to be perceived as non-racist (Bonilla-Silva 2006).We must design social tools that incorporate added layers of privacy as well as ways to disengage in discussions that have become harmful for users protect them from dealing with the struggles of talking to someone who does not "get it." This can be especially important when in most extreme cases, there are people actively attempting to cover up themselves on whether or not they really "get it."

4.5.3 Trust and Agency

A major barrier between technology and those who seek to use technology for support after racist experiences is trust. For example, for many of our participants, the benefits of a large pool of potential supporters on social media cannot outweigh the concern that their support-seeking and vulnerable disclosure will be used against them in the near or distant future.

First, the question of trust in determining who "gets it" or does not as discussed above become particularly complicated in sociotechnical systems. In theory, online social cues can indicate to targets who could potentially be trusted to "get it" and who cannot. In some cases, the context of the space provides enough assurance that it is safe (e.g., sharing of street harassment stories is the stated purpose of the Hollaback platform (Dimond et al. 2013)). However, in executing this idea, one risk is that the social cue does not necessarily represent an accurate gauge of understanding and support, particularly without a way of vetting or validating the intentions or the level of understanding possessed by the users who are "marked" by those cues. For example, invisible audience members with malicious intent might be present (Dimond et al. 2013) or cues may be adopted and displayed by well-meaning allies who, at best, are under-prepared for supporting people dealing with trauma and, at worst, are performing empathy and allyship in shallow and invalidating ways (e.g., 'slacktivism' or engaging in trivial online activism for the main purpose of social participation (Rotman et al. 2011), causing additional burden to those who seek the space for its intended use of social support. In a more extreme example, `hashtag hijacking' occurs when people with explicit desires to do harm can easily co-opt online spaces using hashtags by flooding them with hateful, disruptive, and malicious content (Jain et al. 2015). While online platforms provide the benefit of wide access to potential supporters, support-seekers need tools to navigate these spaces and protect themselves (e.g., through selective visibility (Carrasco & Kerne 2018) from both intentionally and unintentionally harmful interactions.

Second, users must trust the platforms they are using to seek support. There have been many public scandals with various technologies and social media platforms that have infringed on people's privacy (Talib et al. 2014). For example, many apps such as Snapchat will track user location and information is not made available to the public on where or how this data is used and stored (Pultier et al. 2016). This ambiguous use of personal data can cause user's to feel that their privacy and security are threatened by technology. Along with this, many online platforms are not automatically thought of as safe spaces. The prevalence of online trolls and harassment are high in online communities, and even with moderators, it can be difficult to instill in users a sense of safety that would lead them to be comfortable sharing intimate and potentially traumatic

experiences (Scheuerman et al. 2018). Some online communities such as Reddit, have already combated this by allowing users to implement a ‘SERIOUS’ tag onto their posts, allowing mods to skim through and delete posts that may be an attempt to troll or fail the original poster's trust (Dosono & Semaan 2018). However, this relies on the platform's ability to maintain a certain level of trust and integrity within its users, such as avoiding abruptly changing privacy policies in order to further gain as a business (e.g., Facebook's micro-targeted ads (Korolova 2010)).

Finally, do users trust that they are the ones in charge of their own process? Any technology needs to maintain the user's agency (Jia et al. 2012), including the agency to decide when and how to process their experiences with racism and to seek support. There may be situations where it is more psychologically protective to delay processing and coping with an experience. This means that any form of technology used to alert about a racist event or stress cannot interrupt the users daily life.

For any of these systems, we could begin proposing a series of solutions to mitigate our highlighted risks, but that is not the goal of this chapter. We seek to illustrate the need to engage in iterative stages of critical design when designing and prototyping interventions for coping after racist experiences as well as the need to anticipate the potential for any idea to unintentionally exacerbate, rather than support, coping processes. I will undertake this challenge in chapter 5 through a series of participatory design workshops.

4.6 Limitations

We acknowledge that our sample and data have limitations. First, our sample is relatively homogeneous, consisting of primarily well-educated residents of the same mid-sized U.S. city. We know that experiences with racism may have negative impacts on success in academic and professional contexts. Given that our sample is college-educated, they are more likely to have already succeeded in overcoming some of those negative impacts. Second, by virtue of responding to our recruitment text, our participants may be biased towards being more comfortable speaking about their experiences of racism. This might mean that they have already

processed and narrativized their experiences, or may already be more resilient to racism. Third, all of our participants scored high on the MEIM measure for racial-ethnic identity (Table 1). This means that our participants consider their racial identity to be important and valuable to their sense of self. Understanding the practices and concerns of individuals who may be more resilient to racism at a baseline provides valuable lessons and signposts for the types of interactions or support-seeking behaviors that should inform future design. This baseline might enlighten future work that can help individuals who differ, from our participants, in racial-ethnic identity or resilience towards racist experiences.

Although the current study focused primarily on social processes used to recover from racist experiences, our participants also informed us about other strategies they used. Most notably, participants described processes by which they reclaimed their identity. Some participants deepened their connection with their racial identity, for example by engaging with existing cultural practices related to their race. Others deprioritized their race and prioritized other aspects of their identity, while still others used "code-switching" techniques (DeBose 1992) to make their racial identity more and less salient depending on the context.

4.7 Summary & Future Work

"*I mean, you get it, right?*" -P23

In this work, I explored the complexities and nuances involved in seeking support following experiences with racism. We find that uncertainty surrounding the nature of the experience as well as its consequences is a primary motivator for support-seeking behavior. Once a target has shared with a potential supporter, supporters and targets work together to make meaning of the event through uncertainty reduction. This is typically only possible when a supporter first validates the subjective experience of the target, either in-the-moment or through previous interactions with the target. When potential supporters introduce additional uncertainty during the meaning-making process, it hampers the coping of the target. Targets engage in a number of

practices to ensure that they have ready access to potential supporters, such as cultivating relevant relationships before a racist experience occurs.

With this understanding of how and why people cope socially with interpersonal racism, we can begin envisioning the future of supportive sociotechnical systems. These systems must promote the safety and empowerment of people from marginalized groups in fighting against their experiences with prejudice and marginalization by sharing, communicating, and supporting each other. Empowerment has to begin at the source and bring people to the table in designing this future. In the next chapter I continue this work by bringing targets of interpersonal racism into the design process through participatory design workshops. Using a framework cultural design probes (e.g., Wallace et al. 2013), targets of racism will be encouraged to brainstorm and propose both near- and distant-future technologies that might fulfill the needs identified in the present interview study.

Chapter 5: Foundational Fiction Participatory Design

In this chapter, I present new methods for participatory design as well as the results from a set of participatory design workshops focused on technologies that could aid in coping with interpersonal racism. Early results from this work are published at the DIS 2020 Work-in-Progress track led by Hillary Carey in collaboration with myself, Geoff Kaufman, and Jessica Hammer.

5.1 Introduction and Motivation

From the previous chapter, we understand that uncertainty extends the life of the trauma emotionally, mentally, practically because it lingers. In the case of marginalizing experiences that are felt intrapersonally, uncertainty may raise questions about the self in relation to ability and belonging (e.g., what is this lecture about? am I good at math? should I keep pursuing this degree or is this not for me?). In the case of interpersonal, racist experiences, uncertainty raises similar questions but with an added sense of urgency and often with immediately higher stakes (e.g., why do I feel so upset?, did that just happen?, was it intentionally racist?, am I in danger?, how do I stop it from happening again?, what will happen to me if I report it?, etc.). Now that we understand the ways that uncertainty is at the core of the emotional experience of interpersonal racism, we can begin to design for uncertainty management and reduction as forms of coping.

We have also seen that although many social technologies exist and social coping is shown to help with uncertainty reduction through meaning-making and validation, people of color tend to avoid most “standard” or “mainstream” social technologies for coping with racism. This is a problem! A huge portion of the population has a specific, damaging issue that our current technology does not help them with.

To begin addressing these design challenges head-on, we turn to participatory design. We want to be generative and to include people of color in the process of designing more empowered futures, where social technologies are built prioritizing some of their most pressing and ignored needs. Participatory design is ideal for empowering people who are underrepresented in design

spaces towards consciousness raising (e.g., that I am not isolated in experiencing my problems), validation (e.g., recognition that my problems are important), and speaking out about their needs (Greenbaum, 1991). Specifically, using participatory design we seek to understand:

> RQ. What are the qualities of technology that support people when coping with uncertainty resulting from interpersonal racism?

However, existing participatory design methods are limited in their ability to facilitate generative conversation around sensitive subjects such as racism, particularly with groups of strangers. So we begin this research first by adapting and innovating how participatory design can be used to discuss and engage with the sensitive topic of experienced racism. In SCIPR, we see how games can provide an alibi, a safe space for negative emotions. Drawing again from game design techniques, we designed a fictional, interactive vignette as a conversation-starter for discussing racism and integrated it into a participatory design workshop method. The narrative includes a racial microaggression, which by definition introduces some level of uncertainty. By providing a shared experience for participants to discuss the challenges of coping with interpersonal racism we provide privacy and agency for participants in disclosing their thoughts, opinions, and personal experiences. We then use that fictional vignette to build a participatory design protocol that encourages participants to engage in meaning-making together to reduce any uncertainty from the narrative and move towards generating socio technical solutions, from realistic and futuristic.

This chapter contributes both methodological contributions for participatory design around vulnerable, sensitive topics as well as findings from deploying this method to generate designs for social coping with experiences of racism. It is structured as follows. In section 2, I first review related work in participatory design (PD) with a focus on challenges and opportunities in existing methods for engaging with race and other sensitive subjects. In sections 3 and 4 I detail our methodological design in crafting an interactive fictional vignette as well as using that vignette to facilitate groups of strangers in PD workshop activities. In section 5 I report on the deployment of these methods for the CARE project. Section 6 reports on the results of those work and section 7 summarizes our key findings both for how these methods might be used in

other contexts as well as findings specific to the CARE project's goals of designing for coping with racism. In section 8 we report an evaluation of three design provotypes inspired by the PD workshops. In section 9 we report an evaluation of how our interactive narrative vignette might prime people to evaluate racism in the story.

5.2 Background

5.2.1 Participatory Design Methods

We understand that the current state of technology is failing people of color - they don't feel comfortable or safe seeking social support for vulnerable or sensitive topics for very particular reasons that they can pinpoint. At the same time, social support and social meaning-making are amongst the most powerful tools for reducing and resolving the overwhelming uncertainty that comes with experiences of interpersonal racism. Our goal is to empower and facilitate that people who experience racism design a future where their social support needs are prioritized in the creation of social technologies:

> "*The heart of the futurist's job is to create spaces of heightened understanding, strategic engagement, and creativity. Our work is fundamentally about enabling insights that can be useful to others, rather than merely dispensing such insights. This means that the role is more facilitative than communicative*" (Candy, 2014).

Yet, little work has been done in developing research methods that care for the participants during sensitive discussions of topics like racism. For people who experience racism, talking about it is important, but daunting. In some cases, discussions are met with denial, dismissal, or even outright hostility (Andalibi, et al., 2018; Debatin et al., 2009; Sue, 2010; To et al., 2020). Therefore assembling a group of strangers in a PD session and asking them to self-disclose may exacerbate the risks of harm, especially when conversations run the risk of amplifying uncertainty when engaging in meaning-making with a group of people who cannot empathize (To et al., 2020). Additionally, because racism is experienced differently by people from different groups (Sue, 2010), talking with another person who belongs to a racial minority group does not signal that disclosures of racism will be safe to discuss. Therefore, it was important to

structure our workshops in a way that would provide safety for a diversity of participants around vulnerable topics.

We drew on established methods from Participatory Design in order to create participant-centered conversations that could constructively approach idea generation from the lived experience of those who have experienced racism. Participatory Design, as it was developed in Scandinavia, seeks to shift expertise away from research experts toward a shared creative process that develops between researchers and those engaged directly with the challenge. Muller describes the intention of PD this way, "*The PD tradition has, from the outset, emphasized mutuality and reciprocity –often in a hybrid space that enabled new relationships and understandings* (2003, p. 1066)." For our workshops, this meant that participants would determine, together as a group, the key pain points to solve and then brainstorm potential solutions to those needs. Michael Muller describes PD as the opportunity to create a liminal space between the technology specialists and those who would engage with the technology, "*hybrid experiences – that is, practices that take place neither in the users' domain, nor in the technology developers' domain, but in an 'in-between' region that shares attributes of both spaces*" (Muller, 2003, p. 1051). Despite the lack of specific methodology towards methods for sensitive topics such as racism, there is a history in Participatory Design for validating and empowering marginalized perspectives. PD workshops have historic ties to women's movement - to the realization that 'the personal is political' - to the understanding that you are not isolated in experiencing the problems you experience - that others experience them too and they are important (Greenbaum, 1991). By engaging in this kind of participatory design, participants are already validating each others' experiences and reducing uncertainty that they may have entered the space with towards deeper and more productive conversations (rather than entering a space where uncertainty might be amplified). Our objective was to engage participants in discussions about racist interactions and learn from them the types of ways that technology could support their needs.

An additional benefit of what Muller describes as a "third space" usefully shifts all participants (researchers and technologists included) out of daily routines and norms of behavior, opening up

new ideas and new conversations, "*a fertile environment in which participants can combine diverse knowledges into new insights and plans for action*" (2003, p. 1052). That third space can be facilitated by designing around the medium of games. Brandt & Messeter propose that "*by shifting focus to the game, power relations and other factors that might hamper idea generation, are downplayed*" (2004, p. 121) allowing conversations that are evolve based more on the objective set forth by the researchers than what they might normally be concerned by in a more familiar setting.

Participatory Design and Race

There are few references in the PD and HCI literature for techniques for considering race when structuring HCI research - three community-based projects have examined the relationships between researchers and the community participants (O'Leary et al., 2019; Torre, 2009; Vakil et al., 2016). There are strong calls for intersectional considerations (Hankerson et al., 2016; Wong-Villacres et al., 2018).

Focus groups that directly discuss race and racism have been conducted in other fields (Harwood et al., 2018; Sue et al., 2009; Yosso et al., 2009), but for much of its short, but influential history, PD has not considered the importance of race or ethnicity as a factor for diversity of experience or marginalizing experience, despite its political foundations. For example, Michael Muller, quoted above for his insights into HCI and PD, wrote this about representing underserved communities, "*many researchers and practitioners in PD (but not all) are motivated in part by a belief in the value of democracy to civic, educational, and commercial settings – a value that can be seen in the strengthening of disempowered groups including workers, children, older adults*" (2003, p. 1054).

Some recent work in PD describes approaches for working with "marginalized communities," but this work rarely reflects on racial differences in the research approach (Björgvinsson et al., 2012; Le Dantec & Edwards, 2008). We believe this may be due to the difficulty and unique challenges of talking about race and racism.

Design Fiction

While PD has been exploring the use of Design Fiction in collaborative work (Bleecker & Nova, 2009; Buskermolen & Turken, 2012; Cheon et al., 2019; Hauser et al., 2014; Sterling, 2009), our use of fiction is not for speculation or to present a new concept. Our fiction offers one shared, relatable story to connect to diverse participants, which is closer to Dindler & Iverson's use of Fictional Inquiry (Dindler & Iverson, 2007). Our purpose for the narrative is to protect participants from being required to reveal their own painful experiences, providing them with agency in the process of self-disclosure.

5.2.2. Interactive, Narrative Fiction

Fiction has shown to be incredibly useful at relaying both socially complex and sensitive experiences (Mar & Oatley, 2008). For example, fiction has been used to create safe spaces for exploring violence and reconciliation in post-genocide contexts (Bilali, 2014). It provides a safe psychological distance to process experiences of marginalization, trauma, and uncertainty without exposing, while providing enough interactivity to shift the reader from passive absorber to active participant in the narrative.

In psychological research, narrative fiction has been used to create immersive experiences of social interaction and facilitate empathetic understanding of others (Mar & Oatley, 2008). More specifically, fictional vignettes have been used to elicit feelings and perceptions about hypothetical scenarios in order to study cognitive, emotional, and behavioral responses (Freedman et al., 2018). The fictional context provides space for participants to read stories about traumatic experiences without being personally vulnerable. A story provides a safe psychological distance from disturbing situations (Day & Zhu, 2017; Hammond et al., 2007; Harrell & Zhu, 2009; Mar & Oatley, 2008). In clinical contexts, that psychological distance can enable processing through storytelling (e.g., Role-Play, Sociodrama, and Psychodrama (Matthews et al., 2014)) as well as self-expression and relation (e.g., Narrative Therapy (Ricks et al., 2014; White et al., 1990)).

Interactive fiction (aka choose-your-own-adventure games) build upon and expand the capabilities of narrative fiction in these contexts by asking participants to not only read, but to play an active role in the narrative (Green & Jenkins, 2014). True interactive fiction allows the reader to make decisions that impact the story, thus increasing their engagement and sense of agency (Freeman et al., 2017).

In HCI research, interactive fiction has been used for educational purposes , and for participatory storytelling (Bonsignore, et al., 2014), and to address serious topics such as medical care (e.g., Iacovides & Cox, 2015; Yin et al., 2012) domestic violence (Bellini et al., 2020).

5.3 Designing the Vignette

5.3.1 Writing an Interactive Narrative in Twine

We created an interactive fiction about a college student, Sam, who experiences several racial microaggressions (public version here: https://www.alexandrato.com/projects/care-vignette). We built the immersive narrative in Twine (Freedman et al., 2018), an open-source interactive, narrative platform. Participants in our workshops were given a link and asked to complete the task of reading through the story in advance of the session.

By using Twine, we can incorporate iterative decision-making and embedded survey questions within the story to gauge participant emotions in-the-moment (Freedman et al., 2018). Twine also allowed us to deliver the vignettes online so participants could read and "play" the scenario in advance of the workshops.

Our story uses a first-person perspective, which enables participants to see themselves as the character (Kaufman & Libby, 2012) and to connect with the character through shared subjective experience and interpersonal closeness (e.g., through "I-sharing" (Greenberg et al., 2004; Pinel et al., 2006). The interactivity (participants can choose their responses to different moments in the story) is powerful for their engagement with it. Following insights from Bonsignore and colleagues, we started writing from the macro-narrative and identified key story points that all players should experience in the story, while providing room and space for micro-narratives

where players' choices impact the outcomes and development of the story (Bonsignore, et al, 2014).

5.3.2 The Narrative

The story, told in a first-person perspective, begins by introducing your character, Sam. Sam is described as a racial minority undergraduate student who studies computer science and works in an artificial intelligence lab with a Professor Smith. The player walks through a typical day in Sam's shoes, walking around campus, speaking with their roommate in their dorm, and receiving an invitation for a coffee meeting and networking event with their supervising professor, lab mates, and a visiting professor.

The next day, Sam attends the meeting at the cafe and engages in casual conversation with the group. As they are introducing each other and discussing career aspirations and opportunities, the visitor, Dr. Avery, says three microaggressions to your character: "Your English is so advanced. You're so articulate. Where are you from? Well, where are your parents from?" Sam is visibly uncomfortable, but neither Sam nor anyone else at the table directly addresses the racism or inappropriateness of the comments. The scene at the cafe wraps up, and Sam walks to the nearby bus stop with one of their lab mates. The two have a brief conversation and then part ways.

We aimed to write the narrative's focal occurrence of racism in a way that could resonate with most racial minority groups. We use common racial microaggressions (i.e., slights, insults, and assumptions that are often subtle and sometimes even unintended) because these are incredibly common forms of modern racism and their ambiguous nature makes them particularly difficult when it comes to validation and social support. The statement, "Your English is so good," is often directed toward people from Asian and Hispanic backgrounds and among other things, indicates an expectation of foreign-ness and a lack of skill with English (Sue, 2010). The statement, "You're so articulate" often targets people from African and Hispanic backgrounds and again betrays an expectation of lack of ability - I don't expect people from your racial background to speak well (Sue, 2010).

This approach involves two steps for research participants. First, they were asked to complete the pre-work task, individually, from their own computer, once they were scheduled to attend a workshop. We emailed a link to a website that provided a choose-your-own-adventure type of story which we estimated to take less than thirty minutes to complete. Participants moved through an immersive game rich in detail so they might empathize with the main character. In the story they are placed in the position of receiving a racial microaggression and not receiving support during or after it. Next they attended a two-hour design workshop with three to five other participants.

5.4 Designing the Workshop

The practical goal of this research was to generate new ideas about supportive technology, from the perspective of those who have experienced racism. As critical race theory tells us, there is a uniqueness to the BIPOC (Black, Indigenous, People of Color) voice that entails expertise on lived experiences of racial identity. Our additional goal in designing the workshop was to care for the well-being of our participants and make a space to listen to that expertise, while using our expertise as researchers and designers to translate that expertise into design. This began with the choice to use a fictional story to prompt participants for ideas– rather than requiring them to disclose their own personal experiences with racism. Next, we structured the workshops as collaborative and participatory. Lastly, we worked to foster a supportive, respectful environment.

5.4.1 Participatory, Solution-focused Approaches

The structure of the Future Workshop fit well with our goals for participants to create a shared understanding of problems in the present state, then envision a better future, and then prototype it (Brandt, 2006; Muller & Druin, 2007). We relied on that as the overall structure for the workshop. Participants would come together to discuss the fictional narrative as the present state of a racist interaction. We would facilitate a discussion among the participants to share their perspectives on whether the interaction with Dr. Avery was racist, malicious, hurtful, etc and how the main character, Sam, might be feeling before, during, and after that experience. Then we

would use brainstorming techniques to imagine how that experience could be better for Sam, with our added constraint of prompting them to think about how technology (rather than other ways to prevent or heal racism, such as policy, education, national campaigns) could make it better. Through a discussion of the major plot points, pain points, and opportunities, we are able to suss out participants relative awareness of the racial microaggression, emotional reaction, and relative certainty about the racist nature of the comments made by Dr. Avery. Finally, we would ask them to create storyboards as a way to prototype a favorite idea– to explore how the concept might work in context, and how it might feel for Sam to have this new technology.

As an approach to how to discuss and build on the fictional story, we extended Brandt & Messeter's method of a Landscape Game. In their 2004 paper, they demonstrate how to use a structured sequence of activities to build a common vocabulary and establish a shared understanding of the story (Brandt & Messeter, 2004). Each participant having moved through the same story as part of the pre-work for the workshop, came to the workshop with the details they remembered. When participants sat down together, we used the layers of the Landscape Game to create a shared understanding of what happened in the story, how the main character might have felt in each of the key scenes, and what that character needed to feel supported.

In our workshop format, participants sat around a table with three images from the fictional story laid out in front of them. One photo to represent each section: the beginning (before the café), during (the conversation with Dr. Avery and the lab group), and after (as Sam waves goodbye to a labmate and walks home). These photos served as reminders and physical structures to place their ideas onto. To support and record conversations, we walked them through the layers of the landscape they were creating. Throughout the workshop, participants could refer to moments in the fictional story for ideation or share their personal experiences if they wished (self-disclosure). First, participants used pink sticky notes to describe what happened during each part of the story. Then they added how the character likely felt during each segment of the story (orange sticky notes). For the next layer, they identified the needs of the main character-- what might the character want at each moment (green)? This provided the opportunities for new technology-- the last layer (blue). This final layer was the brainstorm. Each participant captured multiple ideas

for ways that current and imaginary technology could offer support before, during, and after a racial microaggression.

As the prototyping activity, participants chose one idea to turn into a storyboard. We provided a worksheet with three frames: before, during, and after. Participants had between five and ten minutes to turn one idea into a story of support during a racial interaction. We were delighted by the willingness of participants to draw their stories, and by the range of ideas that were chosen. From a smart home device that creates a supportive environment to an augmented reality device that rates locations on the likelihood of a racist interaction to video games that reframe BIPOC as superheroes defeating villains of racist oppression to systemic education reform.

5.4.2 Role Playing Activity

An additional stage was added to the Landscape layers in order to help participants think about different ways to offer support, beyond what was provided in the fictional narrative. After layer 2, mapping Sam's needs during the vignette, we paused the sticky note layers and asked participants to switch gears. We developed a short role-playing activity for the workshop group to demonstrate how they might seek social support in different situations. We made four different stacks of small cards that participants could choose from to create a situation. Two participants were chosen to act out a scene. One participant would be the recipient of a racial microaggression. Though the framing of the activity removes uncertainty about the nature of the microaggression (that it is racist), the role-play still reveals different patterns and options for receiving and providing support and reducing uncertainty. They drew cards from three stacks: a microaggression, a technology to use to reach out for support, and the person they might reach out to. We wanted to balance both some agency in allowing the "actor" to choose options that felt natural, but to offer some limitations to make the choices easier and more varied, so they could draw four cards from each stack, and choose which combination felt best to them, (i.e. you are told you are too loud at a concert, you use Facetime, to reach out to a high school friend). Then the second "actor" would draw four cards from one stack, these were methods for offering support. Some of these were useful techniques and some were less useful. The participant could choose which style they wanted to role play. Then the recipient of the microaggression would

begin the scene. They would tell their partner what technology and what relationship they had, and then would act out how they might reach out for social support. We would then discuss as a group: How did that feel for the actors? What did you notice as the audience? What else could give support to Actor A? Did that technology work well? How could it be better? We would run the role-playing twice through, to explore different situations and technology.

INCIDENT	TECHNOLOGY	SUPPORTER	HOW
Someone says, "you talk so white."	Virtual Reality Goggles	Childhood friend	Make them feel cared for
A professor says to you, "I understand what it's like, I have a friend who is Black."	Intelligent Chat Bot	Mother	Make them feel heard
After a presentation, someone says to you, "That was an impressive talk, you are a credit to your race!"	Anonymous online discussion group	Father	Help them solve a problem
A stranger in a restaurant asks if they can touch your hair	Twitter	Co-worker	Help them decide how to respond
You go grocery shopping at a store in your neighborhood. As you walk around, you notice a store clerk has followed you down multiple aisles and is watching you shop.	Facebook Group	Best friend	Mirror their feelings

Table 5.1. Example Prompts for the Role-Play Activity including incident of racism, potential technology to facilitate support, who the supporter is, and how the supporter should attempt to help.

5.4.3 Transparency and Agency

Based on design and social justice work, our facilitation script was explicitly transparent about the context of our work, and set ground rules for collaboration and valuing different opinions (Carey, 2020; Grant & Villalobos, 2008; Light & Luckin, 2008; To et al., 2020). Below is the exact wording we used, but in adapting this method, researchers will need to decide what level of self-disclosure is appropriate, relevant, and comfortable to them.

INTRODUCTIONS
[Alexandra] I am a PhD student in human-computer interaction and I study critical race theory and how people use technology to cope with racist experiences *On a personal note, this work is important to me because outside of the university I am also a racial justice activist. I have my own experiences with racism, as do friends, family members, and colleagues, but there are many experiences that you may have had that I haven't and vise versa.* *In this workshop, my goal is to leverage this position as a researcher at a university to develop tools for empowering people in dealing with both extreme forms of racism but also the everyday racism that many of us have to deal with.* *[Hillary] I am a Design PhD student helping out with this project and I am going to facilitate today. I am working on understanding how design can address racism more directly.*

The key element in this introduction is to make it clear that we, the researchers, have an actual personal stake in the work. Here we are countering dominant narratives that a researcher's only role is to observe and study a population outside themselves.

PURPOSE OF THE RESEARCH
Our goal for this workshop is to learn from you, and many other people, what is needed for technology to offer support after racist interactions. We recognize that for many people, racism is an everyday occurance. We are conducting a series of these workshops and the learnings from them will add to the literature in HCI and design, to bring more awareness of race and its implications to consideration when creating technology. *I am going to first explain how the workshop is going to flow today, and then ask each of you to introduce yourselves. You can say as much or as little about racist interactions in your own life— you don't have to share, but we want you to if you would like to.*

The key element in disclosing the purpose of the research is to facilitate conversation while prioritizing participant agency. Disclosing our position towards our research allows participants to decide whether or not they should share openly with us.

DISCOMFORT
Another thing to mention before we really begin is that racism is a difficult topic, sometimes painful, sometimes sensitive. So we thank you all very much for agreeing to share your thoughts today. If at any point you don't want to answer a question or share a thought, you are always free to decline that. If you need to get up and walk away, you are free to do that as well. Please feel welcome to take care of yourself however you need to, during this 2 hour workshop. We will have a short break after the first hour, too, so that's a moment to pause and check in with yourself and see how you're feeling. *As we're about to move into discussion, we want to introduce a guideline for engagement:* *"During all design processes, differences of opinion and disagreements between different members of the team are likely to arise. This may be inevitable, and can even be a positive part of the process, as different perspectives can lead to more productive and creative conversations"* (Grant & Villalobos, 2008). *Are there any other guidelines anyone else would like to introduce?*

The specific notes on discomfort and disclosure further seek to provide as much information to participants to afford their agency in choosing whether to disclose potentially sensitive or vulnerable information. We again seek to counter the narrative that we have pre-set hypotheses or that our questions have "right" answers - we communicate our participants are the experts, even in their disagreement with each other.

5.4.3 Workshop Schedule

These elements came together for a two-hour workshop. It was a tight squeeze to move through all of the stages, especially because the conversation among participants was often very rich. It

was difficult to cut off discussions about race and racism in order to move to the next stage. This had the unfortunate consequence of limiting time spent on the last stage– storyboarding– to only ten minutes. Nonetheless, in every workshop except the first one, we accomplished all of the tasks outlined as follows:

WORKSHOP SCHEDULE
10 min – Welcome, researcher introductions, purpose, confidentiality, notes on discomfort 10 min – Participant introductions, overview and agenda 25 min – Vignette, layers 1 (what happened) & 2 (how Sam felt) of the landscape BREAK - 5 min 10 min – Scenario Card Enactments (role playing) 10 min – Layer 3 (What does Sam need?) 10 min – Layer 4 (Brainstorming: If Sam could have any technology to help, what could it be?) 10 min – Storyboards, individually choose an idea to develop, show us before, during, and after 10 min - Share out and discuss 10 min - Conclusion, payments, thank you

5.5 Methods

To bring people who experience racism - people of color - into the design of social technologies process, we conducted six participatory design workshops from December 2019 to February 2020.

5.5.1 Recruitment

Participants were recruited through flyers around Pittsburgh, PA and through online social media posts on various platforms. Recruitment materials asked whether they had “thoughts to share about racist interactions” and invited them to sign up for our two and a half hour workshops. Recruitment materials specified that eligible participants must be 18 years or older and capable of completing all study measures in English. Participants were compensated $40 for taking part in the study. Respondents to our ads were then invited via email to sign-up for pre-scheduled workshop slots and sent a link to complete the consent form and vignette before attending the workshop.

5.5.2 Participants

We report on demographic data from our participants that is likely to have impacted the experiences they shared and designs they brainstormed (Schlesinger, et al. 2017). Our sample included 26 adults (21 women, 5 men), aged 18 to 56 years (avg. 25 years).

In recruitment we did not include or exclude people from specific racial or ethnic backgrounds, and instead require that participants have "experienced racism or racial aggression." Our sample included people from a wide variety of racial-ethnic backgrounds (Table 5.2).

P ID	Age	Gender	Racial Background
W1P1	27	Female	African American and White
W1P2	32	Male	Indian
W1P3	19	Female	Asian
W1P4	19	Female	Middle Eastern
W1P5	18	Female	Mixed
W1P6	19	female	Black
W2P1	18	female	Asian
W2P2	18	Female	Black
W2P3	19	Female	Asian
W2P4	19	Female	Filipino
W3P1	19	Female	Asian (Korean)
W3P2	18	female	Chinese
W3P3	30	female	Asian American
W3P4	19	Female	Haitian American
W4P1	30	Female	Indian
W4P2	26	Male	Black
W4P3	18	Male	Asian Indian
W4P4	21	Female	Mixed Race (black, white, indian, hispanic/indigenous)
W5P1	18	Female	Taiwanese American
W5P2	19	Female	Black
W5P3	31	Female	Caucasian/Jewish
W5P4	26	Female	Prefer Not to Disclose
W5P5	20	Female	African American

W6P1	56	male	Black
W6P2	23	male	Hispanic/Latino
W6P3	37	Female	Italian/Irish

Table 5.2. Participant Demographic Data across six workshops including age, self-described gender and racial/ethnic identity.

5.5.3 Study Procedure

Participants who were accepted to the workshop were sent the consent form which linked to the vignette materials up to a week in advance of the workshop and asked to complete all of this "pre-work" before attending our in-person sessions. Participants then attended our workshops in groups of 3-6. We open the workshop by giving an overview of the day's activities, our research goals, and by introducing each of the facilitators including self-disclosure about our relationship to interpersonal racism and research about racism. Each workshop was run following the same schedule (from 5.4.3). The first workshop, unfortunately, ran long due to discussions, so we only made it through Layer 4, brainstorming. Participants in that session did not have time to create storyboards.

5.6 Results

This section presents results from a qualitative analysis of the observations of facilitators in the participatory design workshops as well as written materials produced by participants during the workshops. We share (1) observations about what our specific methodological choices facilitated in the context of the workshop including themes of self-disclosure and relating to the narrative, (2) the themes we identified in the needs activities, (3) an overview of the designs proposed by participants through the brainstorm and storyboarding activities, and finally (4) the themes we identified represented in those designs relevant to the design of future technologies.

5.6.1 Observations About the Workshop

In deploying the Foundational Fiction participatory design workshop method in this first study, we observed several behaviors across sessions demonstrate the usefulness and power of this method. Starting most generally, the experience of participating in the workshops appeared to be engaging and enjoyable. Following several workshops participants exchanged contact information and even asked us if they could participate again in future. Towards the motivation for the workshops, we also saw evidence that participants: 1) related to the narrative's experience with racial microaggressions, 2) were comfortable in disclosing personally vulnerable experiences in the group setting, and 3) were able to produce many concrete speculative future technologies to empower their own and others' coping with racism. We share observations on these themes below.

Relating to the Narrative

The fictional narrative rang true to participants. They had a high recall of the plot, as evidenced by their ability to create sticky notes to describe what occurred in the fiction. They each connected in specific ways to different aspects of the narrative.

In response to the microaggression in the story, we heard comments like, "Yeah, that's happened to me 4,000 times" and, "I find for brown people like me, people make a lot of assumptions about where I'm from." In one workshop, a student referred to the description of international flags on the door to Sam's apartment, saying, "I felt jealous of Sam's roommate situation, I was like, 'that sounds lit.'"

Self-Disclosing Vulnerable Experiences

Although optional, participants shared many personal experiences with racism. Like any workshop of strangers, they were quiet in the beginning and often did not talk about their racial backgrounds until discussing the "during" scene of the story, when the microaggression occurs. We were surprised by the amount of conversation. This is evidenced by the fact that the first session ran too long, and we were not able to complete the storyboard portion. This was surprising because in our pilot testing, participants who were research assistants working on other aspects of the CARE project were very quiet and did not offer many stories beyond what

was asked. We planned the session to be heavily guided by structured activities. But when a group of strangers came together in the first session, they shared many personal stories that we were reluctant to cut short. This caused each stage to run too long and prevented us from getting to the final activity, which was storyboarding. In the proceeding workshops we were more prepared and therefore careful to move through the stages quickly, to prioritize idea generation rather than storytelling.

We believe that beginning with the fictional story allowed them to warm up and "read the room" before sharing their own experiences. They were not directly asked to talk personally, but as the activities built, every participant shared several of their own instances of racist interactions.

This signals to us that the risk of sharing personal stories was low enough that the discussion felt safe. In all six workshops, the number of statements disclosed about personal experiences with racism increased during the discussion of the fictional offense.

Ideation for Coping With and Preventing Racism

As hoped, we collected many ideas. In our prior work, it was found that people had a deep mistrust of social technology because of backlash, and uncertainty is a key motivator for seeking social support (To et al., 2020). These insights are reflected in the ideas generated. Themes from ideation included: automatic detection and disruption of racist behavior, reflective tools that replay what happened, AI as emotional comfort, and dedicated online spaces to share racist experiences publicly. Participants individually created vivid storyboards to illustrate one of their favorite solutions in context. We were pleased by their willingness to draw, and by the variety of concepts they chose.

5.6.2 Needs for Coping

Participants expressed a number of needs before, during, and after experiences of racism. These needs are universal and not attached to the constraints of either social-support or technology. After coding and grouping we uncovered 10 high-level needs for coping with racism:

1. *Validation and Acknowledgement of Incident [certainty around nature of incident]* - I need it to be recognized by others that something racist happened

2. *Information and Context [certainty around nature of incident]* - I need to understand what just happened, why it happened, and how it impacts me and the world around me
3. *Direct Confrontation of Perpetrator [perpetrator's certainty]* - I need the perpetrator to know that they did something wrong
4. *Get Advice [certainty about how to respond and stakes]* - I need to know what to do next
5. *Empowerment and Belonging [certainty that I belong]* - I need to feel comfortable beyond this moment, either comfortable to do or say something, or comfortable that I fit in here
6. *Empathetic Conversation [certainty about supporters]* - I need to talk to someone who understands me and who will not judge me
7. *Sense of Community* - I need to feel like I have a group of people who will support me
8. *Ability to Leave* - I need to be able to safely and quickly exit the situation
9. *Systemic Change / A Society that is Less Racist* - I need this to stop happening, I need the world to be anti-racist, I know this cannot happen through individual change
10. *Distraction and Joy* - I need to feel better

Needs 1-6 directly address our research questions revolving around coping directly with interpersonal racism through uncertainty reduction. Needs 7-10 address additional needs such as intrapersonal and systemic racism.

5.6.3 Overview of Design Outcomes

During the brainstorming and design phases, participants proposed multiple technologies that might address their or the character Sam's needs when it comes to dealing with interpersonal racism. These designs might be realistic and feasible with today's technology, or might be futuristic and magical.

In each of the six workshops, designs were described briefly with 1-sentence post-its in the first round of ideation, we collected 101 sticky notes with individual ideas (several of these are conceptual duplicates that occurred within the same conversation, or across workshops). In five of the six workshops, we facilitated a second round of ideation where each participant chose one idea to develop more fully through storyboarding with images and sentences. We collected

twenty storyboards that represent the 20 different ideas that participants were most interested in developing further. Here we will provide an overview of the kinds of design that were proposed.

The 101 brief ideas described by participants as they brainstormed together with sticky notes were varied. The ideas ranged in practicality, purpose and timeliness, the type of support intended, and relation to existing and/or future technology. 27 ideas were targeted at helping a person before a potential experience of racism, 32 were meant to be used in the moment and 42 were positioned as coping afterwards. 36 ideas relied on current technologies, 37 on near-term, and 28 on far-reaching capabilities. 57 ideas imagined ways to prevent a racist experience, while 44 provided ways to cope. 39 ideas engaged in a social behavior that involved at least one other person and 62 involved only the targeted individual.

The participants developed solutions with a variety of qualities, for example:

- **from realistic to fantastical**, e.g. “survey students anonymously talk about professor” and “annotations over Sam's field of view showing what people around him think of racism”
- **from individual to social,** e.g. “AI that knows exactly what to say to comfort you depending on personality” and “Virtual reality with your friend/ supportive person you want to reach out to”
- **from focused on the perpetrator to supporting the recipient**, e.g. “a chip that sets implanted in everyone's head that notifies them if they make someone feel bad” and “emotional tags for messages so people understand your emotions”
- **from interpersonal to structural**, e.g. “A button on Facebook that announces ‘I just had a racist experience’ and friends who care can call you” and “move textbook company outside of Texas -> reform education”
- **From gaining comfort from AI to facilitating human interactions for advice**, e.g. “online chatbot that allows people to vent and respond with positive affirmations” to “an advisor or online advisor who could advise you on how to navigate the situation”

Figure 5.1. Sample storyboards from workshop 3 (top left), workshop 4 (bottom left), and workshop 2 (right).

Storyboard Descriptions	**Workshop**
AI that knows how to comfort you personally	2
A superhero video game: you create racist villains and then defeat them	2
An app where you can rant your emotions and then it gets deleted immediately	2
A smart home speaker that asks how you are and offers comfort: listening, stories, scents	2
Conversational technology that learns to accommodate accents	3
A website that tracks whether professors are racist, so you can be prepared	3
A watch that listens for racist behavior and tells the wearer that they have been racist	3
A robot that attends meetings and interrupts if a racist situation happens	3
A website to read about the complexity of racism and a corresponding app that advises on the best action to take during an incident	4
A wikipedia-type site that collects incidents of racism, scientific research on them, and advice on how to respond. People research ahead to be prepared.	4
Siri has a feature that listens for racist incidents, offers options to respond, and then collects feedback on how well it worked	4
An AI app that monitors and analyzes racial incidents, then prints out information for the transgressor and prepares Sam with details about the possible consequences	4
Education programs in grade schools to share traditions and cultures through guest speakers to work against social biases	5
An app for people to learn about implicit bias. It listens for statements and then shares the history behind it	5

A feature on phones that detects racist comments and then locks until the perpetrator reads info about it	5
Siri listens for a racist comment and then speaks up for you, telling the perpetrator not to be racist	5
A review site like Yelp to help people share experiences with racism	5
A non-commercial search engine for racism-- information about situations, the history, and ways to deal with it	6
A version of Twitter where all the content is automatically translated, so you can read stories from people from every other culture	6
Wristbands that monitor conversations at work for racism, people are punished or rewarded accordingly	6

Table 5.3. One-sentence descriptions of the storyboards each participant in the workshop developed.

5.6.4 Design Themes

From the designs participants proposed and storyboarded, we extracted a number of themes. In order to properly honor our participants' stories and desires, we present them with little comment on validity, efficacy, or value here and instead seek to share how participants think and feel about designing for their futures (Parvin, 2018). We want to be abundantly clear that these are NOT design recommendations, as many themes here run as much risk of amplifying oppression than mitigating it. In the discussion we more thoroughly engage critically with these themes.

For the purposes of answering our research questions, we stick to discussing themes that directly relate to the question of coping with interpersonal racism. Themes that address systemic and internalized racism are left to future work.

Use Data to Reduce My Uncertainty by Validating my Experiences

Participants expressed multiple attitudes towards "data" - that it was always being collected, that it would be considered trustworthy and authoritative to others, and that it could be used to track racism. To them, a better technological future was one where they were empowered with ubiquitous data to reflect back their own lived experiences in order to validate their experiences of racism.

Use Data to Reduce my Uncertainty by Preparing Me for Future Racism

The other value of "data" then becomes to prepare BIPOC in advance of potential racism. In these situations participants might desire to either feel mentally and emotionally prepared for a person's racism in order to not be surprised and taken off guard or to avoid the situation entirely. Some participants desired phrases to have at the ready to fend off microaggressions and redirect racist sentiments and actions. Others described that education about the form and frequency of microaggressions - hearing about microaggressions and knowing that they exist before a first encounter - might be all they need to feel prepared.

Participants imagined entire databases of a person's past racist comments and indiscretions, augmented reality vision that had pop-ups of each person's level of racism, and ways for them to manually enter information about people they encounter to help prepare others. Such files might also help them in validating their experience through the experiences of others and in extreme cases, a way to build an argument for legal or HR purposes when a single person's experience is not seen as valid. They again positioned data as a source of empowerment through knowledge and preparation.

When Racism Happens, Intervene on my Behalf In-the-Moment

The most immediate thing people want is for the interaction to stop. Interpersonal racism very often happens in ongoing social situations (e.g., during a conversation with a supervisor vs. a stranger passing on the street). The thing everyone wants to say, but cannot (for reasons detailed in the other design themes) is "Stop. Just stop. Please stop talking now." They envision technology that can be an ally. The overarching theme was that it's risky for targets of racism to speak out, but technology, which is simultaneously seen as a third-party authority and a fallible device, is free from the social and practical ramifications of calling someone out.

Interventions take a large range of forms. In some situations, the desire may just be to stop or distract and change the topic. In other situations, participants proposed publicly calling out the perpetrator ranging from inferences (e.g., Siri on their smartphones speaking up and saying, "Hey actually did you know that she's been asked where she's really from 500 times in her

life?") to actual labeling (e.g., a button I could press under my seat and an alarm goes off that says "that was racist!").

Implicit in technology calling someone out is validation. In order for the tech to call someone out automatically, it must already have identified that something racist is happening. In situations where the participant triggers the technology, they still know that the tech is there to support them and will not deny their experiences.

Leveraging Data to Gain Advice with Certainty About Consequences and Stakes

In nearly every workshop, participants discussed a need to understand the consequences. Often the experiences that stick out the most in their minds are the ones that are most novel or have the highest uncertainty (To et al., 2020). Part of what is overwhelming is the uncertainty about both the short and long-term consequences. Priorities include physical safety, mental and emotional wellbeing, cognitive burden, and future opportunities. Even if they could resolve that first uncertainty about the nature of what happened, they have no idea what to do next.

We heard many participants use the language of Machine Learning or Artificial Intelligence. Have other people experienced something like this? What did they do in response? What is likely to happen if I confront this person? How have they responded to confrontation in the past? For example, the participants in Workshop 4 were particularly interested in the ways that targets of racism could be presented with, or learn ahead of time, recommendations for how best to respond in a particular situation, informed by the context, the people involved, and the possible repercussions. These ideas included: a website to read about the complexity of racism and a corresponding app that advises on the best action to take during an incident; Siri has a feature that listens for racist incidents, offers options to respond, and then collects feedback on how well it worked; an AI app that monitors and analyzes racial incidents, then prints out information for the transgressor and prepares Sam with details about the possible consequences (Table). Here we can see how increasingly public discourse about the power of ML/AI has influenced participants. They know that their data and the data of perpetrators of interpersonal racism might be used to elicit patterns and they desire to learn from those patterns to take action. What can I do and say next that will result in the largest benefit and least harm to me?

Relieve the Burden of Explaining Myself

It is incredibly burdensome to explain my experiences through existing technologies. Participants are often exhausted and emotionally spent following racist experiences, and especially vulnerable to invalidation. Finding a space or a supporter and then repeatedly having to describe and redescribe the context of the experience, rehash and reconstruct what happened, etc. is too high a burden that it becomes not worth it to even seek support.

Help Me Digitally Express Emotions and Receive Emotions

Seeking support is difficult because I don't always have the words to describe how I'm feeling. An in-person supporter can look at me and read my body language to see my hurt and exhaustion, anxiety, fear, anger, or other emotions. I feel I can't communicate this textually or through typical communication means. I want to receive back love and empathy, but I don't feel those things when people message me. I want to feel true connection - the kind I'd normally get through eye contact, body language, and sometimes touch.

Make Technology that Prioritizes my Comfort and Protection

My technology is always with me, in a way that even my closest supporters cannot always be. I want my technology to have a more friendly relationship with me. I want it to notice when something is wrong with me and to try to make me feel better. It should show that it knows me and cares about me. It should validate my experiences and help me navigate difficult situations.

5.7 Discussion

Here we discuss considerations and implications following our deployment of the Foundational Fiction method, learnings from our participants' design proposals, and outline how this Study 1 informs our future design work in Study 2.

5.7.1 Using Fiction to Facilitate Conversation and Co-Design

Facilitating Speculative Future Conversations Around Racism

We were uncertain how vibrant the conversations would be as we planned the workshop. We prepared ourselves for the discussion between participants to be slow and hesitant because

talking about racism with strangers is difficult. But instead, we found that participants, after building rapport, were often eager to have new conversations. Many remarked, "I haven't talked about race like this before," and asked for other places on campus where they could continue the conversation. In line with other perspectives on prototyping, we can see how the products of the Foundational Fiction method go beyond the artifacts produced by participants, but also manifests as the understanding, communication, and relationships formed through the research process (Tscheligi et al., 1995).

The skill of reflecting on personal experience and examining what will actually help in a given moment is not something that everyone has desire or time to do. In these workshops some participants had a more critical lens on racism; these individuals were typically already active in anti-racism work in public or education spaces (which may also have contributed to their interest in attending the workshops). Other participants rarely talked about racism in their daily lives and did not seem to have as much comfort describing incidents of racism or how it affected them. Light and Luckin write about the possibility of Participatory Design to facilitate faster agency in participants:

> "*Effective participative design can lead to a greater understanding of the design process by all, with participants becoming more skilled in design processes, and, through their participation, learning more about their own potential agency* (Light & Luckin, 2008, p. 4)."

While they are referring to longer-term engagements than our two-hour workshop, it is possible that an open discussion among BIPOC about racism provided more confidence to declare, something like, "yes, that was racist," that is less allowable in our wider current culture. It is important to recognize that while each is an expert in their experiences of racism, not everyone has developed skills in how to go about fixing it. As Muller describes, the process of declaring and labeling your own needs, and those of others-- "articulating, clarifying, and informing the needs of themselves as individuals, and of the people they are connected to or responsible for (2003, p. 1052)" may foster reflexive insights for those in the conversation. This often manifested through design proposals that included early education about the nature of racism.

Safety, Vulnerability, and Social Validation

In chapter four we found that figuring out the "right" person to disclose to was one of the most challenging aspects of coping and processing with racist experiences - namely because of the risk of invalidation and denial of experiences. Some supporters, intentionally or not, harmfully amplify a support-seeker's uncertainty. Our workshop protocol was designed with this in mind and we explicitly avoided asking participants to directly disclose personal experiences. To our surprise, personal disclosure was one of the most generative and fruitful parts of each and every workshop. Every participant in every workshop shared more than one specific, personal experience with racism. Over the course of the workshop, we saw increased confidence and comfort labeling those past and the fictional narrative experiences as being racist (as compared to their early workshop language that centered around "ignorant, well-intentioned but misguided, and biased" people who had made "uncomfortable or inappropriate" comments). Through the structure of the workshop, we observed a shift from high levels of uncertainty (about how to engage, about the purpose of the research, about whether or not there were 'right or wrong' answers, about how others might have interpreted the racist conversation) to self-assurance and confidence in labeling and designing to combat racism. At a meta-level, the act of engaging with the participants and researchers in the workshop space was a form of coping with and reducing uncertainty around racism.

To us this signals that the workshop effectively creates a "third space" where participants are in an unfamiliar environment, but encouraged to cooperatively construct new norms, goals, understanding, commitment, and mutual education (Muller & Druin, 2012). More specifically, it creates a third space where workshop participants consistently validate each others' experiences of racism, work towards an understanding of how racism looks different to people from different racial group than their own, and construct visions of futures where technology is created to prioritize their coping with regular experiences with interpersonal racism.

The workshop space is a safe space for vulnerability. This of course cannot be done without careful moderation and facilitation. In workshops, the facilitators avoided denying or rejecting participants' interpretations, but were careful to pause and reflect at various points in the

conversation (e.g., when things became emotionally intense, when participants posed questions to the researchers about whether or not their interpretations were "correct") and recentering the group on being generative together.

Co-Design Around Marginalization and Justice

The volume and diversity of design proposals along with consistent, unsolicited personal disclosure is evidence that the Foundational Fiction method successfully can be used for co-design around vulnerable and marginalizing experiences towards justice-oriented outcomes. The ideas proposed by participants represented a range of ideas for technology that focus on healing the pain of daily racism.

By encouraging participants to reconstruct the narrative in the framing of before, during, and after, we are pulling from experiential-focusing and priming techniques to reduce memory reconstruction errors and pull participants into the narrative first-hand experience with racism while also connecting to a broader framework that can be related to their own personal experiences. For example, participants proposed ideas that targeted the emotional and cognitive aspects of experiencing racism (e.g., tools that relieve the cognitive load of making a decision, tools that send you a message in the moment to make you feel better through validation and care). We have seen through the proportion of proposals targeted in each area of before, during, and after racism that this framing pervaded the brainstorming and idea generation processes. For example tools to track the likelihood of experiencing racism at an upcoming meeting fit within the coping before racism phase, while tools that record and listen to conversations in order to label them as racist and alert the user target the during phase.

More broadly, this workshop method facilitated conversations around designing for more empowered, justice-oriented futures.

> "*Designer and scholar Carl DiSalvo argues for adversarial design, an approach rooted in the political theory of agonism. DiSalvo urges designers to create contestational objects, challenge hegemonic power structures, and offer speculative alternatives. As DiSalvo says, `Design can produce a shift toward action that models alternative presents and possible futures in material and experiential form.`*" (qtd from Costanza-Chock, 2018)

The Foundational Fiction brings people who experience a wide range of types and intensities of racism on a everyday frequency into the co-design of anti-racist technology.

In conducting this first study using Foundational Fiction we identify two key limitations. First, as is the nature of a participatory design workshop, this method encourages a focus on ideas that the general group finds agreeable, rather than focusing on individual preference. Although we received a wide range of design proposals, we observe in the conversations in the workshop how participants might be influenced by ideas that others respond to the most favorably.

Second, this method is not best suited to address structural and/or systemic oppression. While themes of structural racism were prevalent in discussions with participants (more in section 5.7.2), designing for structural change might require a more specific grounding and education than our single microaggression vignette can provide. Participants were able to extrapolate and identify moments of systemic oppression in the story, implying promising avenues of future work.

5.7.2 Designing Social Technologies for Coping with Racism

This study used a fictional narrative about a racist microaggression to scaffold conversations and ideation about interpersonal racism and social methods of coping, towards the design of future social technologies. Our initial research questions involved understanding what qualities of technology could support people in coping with interpersonal racism.

As has become common in participatory design research (Agid, 2016; Blythe et al., 2016), the workshops brought to the forefront unexpected insights indirect but essentially important to our research questions - particularly around our participants' perceptions around racism and social technology, as well as the ways that interpersonal racism exists within a much larger network of systemic and ideological racism. Incorporating tactics from critical design and design justice, we discuss the implications of these themes both for designing social technologies to support coping with racism and in understanding the alignment of participants' stated desires and their unintended and unforeseen consequences. This leads us to detail how those insights inform our subsequent follow-up study focused on designing and evaluating provotypes.

Interpersonal Racism Can't Be Addressed Independent of Systemic Racism

Within the "three levels of oppression" framework (interpersonal, institutional, and internalized) (David et al. 2018), our research has focused on "interpersonal" racism - racism that happens in interactions between individuals and/or groups of individuals. Throughout the workshop, our participants brought the other two I's: internalized (i.e., beliefs about the inferiority or superiority of certain racial groups) and institutional racism (i.e., policies, procedures, structures) into the conversation and into their design solutions. Those solutions reveal a nuanced and complex conceptualization of racism, expressed through desires for a less racist world, to encounter less racist people, to have better education for what racism looks like and how to safely react to it, and to have a caring, non-extractive, unoppressive relationship with technology. These aspects of coping with racism are inextricably linked. For example, a change in a policy or law might lead to changes at the individual and interpersonal level. This reinforces what others have written - that we cannot separate how the different kinds of oppressive racism interact, impact, and amplify one another.

This also reifies our approach to this research, which is to underscore that racism is not "curable" or "solvable." This is an important reminder to technologists and an important reminder to us. It would be unethical and impractical to frame this work as one that might "solve" racism. We know that the roots of racism run so deep that, even in a world without racist people, there would still be racism (e.g., Bonilla-Silva, 2006). Our work encourages us to imagine and design social technology that better supports the targets of interpersonal racism in their coping process. There are many avenues for future research in exploring how technology can better support identifying, coping with, and dismantling systemic, ideological, and internalized racism.

Necessitating Data-Based Evidence Normalizes Surveillance

In the theme "Use Data to Validate My Experiences" we observe that participants experience data as an authoritative entity. They express an understanding that their "data" are being collected at all times, without their consent or knowledge - it is just the way of the world. In their design proposals, they suggested using location data, audio recording of conversations with others, speech transcription of those conversations, sentiment analysis, facial recognition, calendar events to track where you are and who you are with, emails with racial bias detection,

and more - not as tools that might exist, but that tools that exist now that can be used to support the targets of racism. Rather than fighting what participants expressed to be a problematic but inevitable present, they envision a future where that data is used for them rather than against them.

That desire for increased capability for data-based validation lives in friction with understanding that data discrimination and the amplification of bias and harm against women and BIPOC has been pervasive in online technologies (Noble, 2018). In future work our responsibility lies in making assumptions more visible, to play out the whole system that this would put into motion, assess the ethics and pragmatics, costs and benefits, of fulfilling this desire, and then check, is this still a good fulfillment of need?

Education vs. Anticipation Around Interpersonal Racism

The themes on being prepared align with prior research indicating that the surprise and uncertainty that come with racist interactions can make those experiences devastating in a long-lasting way (To et al., 2020). In proposing designs that better prepare them, we can observe 1) an educational component, 2) a person-specific component, and 3) a response and reaction component.

The desire for education on the nature of racism aligns with prior research that indicates that learning about the nature of harmful stereotypes can lessen their impact (e.g., Johns et al., 2005). Knowing the signs and an awareness of how modern racism operates can helpfully reduce uncertainty across contexts. In our participatory design sessions, many of our participants were either unfamiliar with the term “microaggression” or unfamiliar with the specific mechanics of microaggressions that make them harmful (e.g., that they can be unintended, that they have a cumulative impact, etc.). There are opportunities here not only for systemic change in how we educate (or currently do not educate) about racism, but also for social technologies to be educational. For example, social media sites such as Facebook and Twitter allow users to report harmful content, but typically use labels such as “Abusive or Harmful” with sub-labels such as “directing hate against a protected category.” These labels implicitly make value statements about what is worth or not worth consideration as harmful on these platforms. Here there is an

opportunity to educate targets and perpetrators of racism - especially when the harm is real but unintended.

By contrast, the preparation participants proposed about specific individuals raises serious concerns. Participants proposed augmented reality tech that could allow them to quickly see a person's history of racist remarks as well as email sentiment analysis tools that might measure racial bias in writing. Regardless of the obvious security, privacy, and legal concerns this might raise (discussed more below), these technologies are likely to backfire on targets of racism. Raising a person's certainty that someone they will need to interact with will be racist towards them or hold racist attitudes towards them is likely to cause other forms of harm to the target (e.g., anxiety, paranoia, social discomfort, etc.) without actually buffering them against the harm of a potential future racist interaction.

Technology that Comforts and Relieves Burden

Many of the themes related to relieving the cognitive and emotional burdens that come with experiencing interpersonal racism. Prior research has shown how humor has been used both as a coping mechanism (To et al., 2020) as well as a facilitator for sussing out racial attitudes in conversation about racism (e.g., Barnes et al., 2001). In the themes, "Help Me Digitally Express Emotions and Receive Emotions," "Make Technology that Prioritizes my Comfort and Protection," and "Relieve the Burden of Explaining Myself" we can observe a desire for technology to similarly alleviate the mental and emotional burden of communicating with others about racism. In some situations, there is a desire for technology to augment those conversations - to reduce the barriers of conveying not only the pragmatics of the experience but to convey the fraught emotions behind it. In other proposals, participants expressed a desire for technology to be an ally or even a co-conspirator in coping with racism. These ranged from Siri, Apple's intelligent assistant becoming vocally anti-racist, to conceptions of smart homes that detect your mood, converse about and validate experiences of racism, and provide comfort through words, as well as ambient changes to the environment such as changes to lighting and scent.

Participants perceive technology again to be ubiquitous and integrated parts of their lives and express a desire for emotional closeness to that technology. This runs somewhat counter to

dominant narratives on technology - that they are tools for productivity and that technology that encourages behavioral change is there to help you "be the best you" (e.g., fitness tracking, screen time monitors, etc.). Rather there is a desire for technology to make you feel better through connection, empathy, and comfort.

5.8 Limitations

This sample and data have a few limitations. Our participant sample by design included people who are comfortable sharing their opinions about racism with a group of strangers. Although the design of our workshop may have facilitated these conversations, all participants responded to our initial advertisement which poses the question, "Do you have something to say about racist interactions?" We therefore expect that even for the least experienced of our participants, there is a baseline level of thought and comfort around these topics. Relatedly, there were many more women in the study than men and no participants who identified as genderqueer or non-binary. While meta-analyses tend to indicate that men and women do not experience emotion differently, there is considerable evidence that there are gender differences in the expression of emotion - which may be attributed to social roles (Helgeson, 2015). While race and racism tend to impact women and men differently (e.g., misogynoir (Bailey, 2010; Bailey & Trudy, 2018;)), there was no evidence of variation in our results by gender. We expect that the desires may differ for people who are targeted by racism who are less comfortable or familiar with thinking about these issues in depth.

This work also operates from a U.S.-specific context of race and racism. Even within that specific lens, it is difficult and not well-advised to write about the experiences of BIPOC as a monolith. As evidenced in the writing of the racial microaggression in the interactive narrative, people from different racial minority backgrounds experience interpersonal racism along very different axes. This work does not intend to collapse those experiences, but instead to explore what kinds of designs might empower as many people as possible in coping with interpersonal racism.

Finally, because the narrative focuses on racial microaggressions as opposed to more overt forms of racism, there is a risk that this work might produce designs and design insights that are only applicable to more subtle forms of racism. However, in the conversations we saw evidence that participants built on that experience to discuss a wide range of experiences with racism, including overt forms such as hate speech and violence, as well as institutional and internalized forms of racism.

5.9 Future Work

By designing and utilizing the "Fictional Foundation" participatory design method, we have embodied an anti-solutionist attitude in our work (Blythe et al., 2016; Carey et al., 2020). In other words, the designs proposed by participants have, as intended, revealed our assumptions, highlighted underlying existing dynamics in the space of interpersonal racism and social coping, and made room for "naive, fragile fictions" (Blythe et al., 2016). Participants' proposed designs ranged from the extremely practical to the magical and fictional. The work does not end here. With an deeper understanding of the risks and stakes associated with designing technology for coping with racism as well as an understanding of what people who are most directly impacted by this technology might be, our future work now can involve putting those designs back into the context of today's world and evaluating how they might impact social coping with racism.

What happens when you validate a racist experience publicly, in-the-moment? What does it feel like to be comforted by technology? How is uncertainty impacted by these technologies, and does increased certainty lead to better emotional experiences? We explore this in our next study in designing and evaluating design provotypes.

5.10 Summary

In this work, I explored how technology, both practical and speculative, might be used to empower BIPOC in the process of coping with racism. In order to explore this space, this work necessarily produced methodological contributions for participatory design tailored specifically

to BIPOC. I developed a fictional, interactive narrative that delivers uncertainty through first-person perspective experiences with racial microaggressions. In order to help participants explore and assess uncertainty, my team and I developed a participatory design workshop that facilitates conversation in reconstructing, analyzing, and designing for both the fictional experience as well as the personal experiences participants may bring to the workshop space. Through the workshops I observed the powerful ways that participants reduced each others' uncertainty through validation and the sharing of common experiences with racism and racial microaggressions.

From this work I uncovered a broad set of desires for how technology might empower individuals in coping with racism. Relevant to this thesis' focus on uncertainty, we uncovered that participants have a very specific perspective of the role of technology in validating their experiences - that regardless of their own certainty, technology which was seen as an objective third-party entity, could powerfully provide evidence and assurance that racism was happening, not only to targets of racism, but to perpetrators and bystanders as well. In other words, for many participants, the authority that "data" and "technology" hold in the public mind could powerfully bolster their voice and put a stronger spotlight on inappropriate and racist behavior.

In the next chapter I put these design themes back in context through design provotypes. The proposals in this workshop range in reducing uncertainty about the nature of a racist incident, the nature of a person who perpetuates racism, and about appropriate reactions and consequences. What then emerges as important and how does this impact coping in-the-moment?

Chapter 6 - Designing and Evaluating Provotypes

In this chapter I present the design of three provotypes created to embody some of the major themes from the participatory design workshops. Each provotype embodies a different form of uncertainty reduction. I present findings from an evaluation study using interactive fiction to present the designs so that users might interact with them in-context.

6.1 Designing Provotypes

In order to evaluate our participants' proposed designs, we synthesized and distilled their proposals into three design provotypes (i.e., prototype meets provocation) that would represent the range across the design themes. A "provotyping" approach uses these concepts as a way to "reflect on existing practices" (Boer & Donovan, 2012). In this way, we are not suggesting that these technologies are on a path to production-- there are many concerns with the user experience of these somewhat futuristic ideas, nor are they ideas that we believe *should* be developed. They simply represent ideas for how technology might help people cope with everyday racism. These provotypes are put in front of participants in order to provoke ideas about the role that technology might play in racist interactions, not to propose specific design directions. In evaluating the provotypes, we can further unearth the assumptions embodied in their proposed technologies as well as assess what it might look like to use these technologies in-context. In evaluating the provotypes, we want to know:

RQ1. How do the design provotypes impact people's certainty of racism in the conversation?

RQ2. How do the design provotypes impact people's emotional experience of the conversation?

RQ3. Are there demographic differences in how people respond to the design provotypes differently?

To answer these questions, we adapted the fictional vignette as a method for user testing. In this section we document our design process including our process for selecting, combining, and

curating our participatory design workshop participants' proposals down to three concrete design provotypes: 1) Racism Alarm, 2) Smartwatch Ally, and 3) Comfort Speaker. As detailed in 5.2.3, a provotyping approach (provocation + prototype) allow us to evaluate the designs, which are "naive, fragile fiction" (Blythe et al., 2016) in-context. We describe each of the provotypes, their intended use, and the design themes they embody. We end by describing how we represented the designs in the context of the fictional vignette.

6.1.1 Evolving the Design Concepts from the Participatory Design Workshops

In order to represent the range of designs proposed by participants while balancing pragmatic considerations, we chose to develop three concepts for evaluation. As we culled and combined the 101 future technology ideas that participants created down to the few that we would be able to test in a follow-up survey, we considered two factors: 1) the level of interest from participants in the workshops, 2) representing a diversity of attributes of coping with a racist interaction, and 3) our assessment of value vs. harm. We prioritized ideas that were present in the participants storyboards as a proxy for interest - participants at that stage heard many ideas from each other and were asked to select the idea they were most interested in seeing developed. Led by our findings in the participatory design workshops, we eliminated ideas that we assessed to be potentially more damaging than helpful in supporting targets of racism. For example, we removed a proposal to prepare Sam ahead of time with a warning that Dr. Avery has said racist things in the past. From this first pass two researchers on the team developed 16 concepts to develop into storyboards.

After the initial storyboards were developed, two additional researchers on the team reviewed and evaluated them. Their criteria for evaluation were: 1) representing a range of realistic to futuristic and fantastical designs and 2) whether or not the storyboards could seamlessly integrate into the existing fictional vignette. In evaluating fit in the vignette, we necessarily excluded ideas that involved structural systems (e.g., workplace anti-racism training, middle-school BIPOC history educational programs). In this phase, some storyboards were removed from consideration

and others were decomposed as they represented too many themes and interactions (and thus would be difficult to properly evaluate). This produced 13 new and/or iterated storyboards.

Finally, we used the Pugh Matrix process (Pugh, 1991) to assess the qualities of our final round of concepts, in order to make the final prioritization in alignment with our research questions and agenda (Table 6.1). There were 4 attributes in this final round of prioritization: 1) does it aid in coping after an experience of racism?, 2) does it aid in reducing uncertainty?, 3) does it represent design themes that are different from the other ideas, and 4) can it be easily incorporated into the vignette?

Design Description	**Coping after?**	**Reduces uncertainty?**	**Fits into vignette?**	**Unique?**
A language analysis tool that takes recordings of incidents as input, assesses racism, then posts to a secret hashtag on social media where only people who 'get it' and experience racism can have private conversations.	Y	4	5	1
A language analysis tool that takes recordings of incidents as input, assesses racism, then provides tools for directly confronting the perpetrator to facilitate conversation.	Y	5	5	1
A calendar application that allows you to quickly record moments of racism with contextual notes so you can look back over weeks and months and reflect on when and where you encounter racism to find patterns.	Y	3	3	4
*A smart speaker (e.g., Amazon Alexa) that comforts you when you come home and can talk about racism.	Y	4	4	5
An app that tracks your bio data that you can alert to racism, when your bio data spikes, it will call your phone as a distraction / excuse to exit the situation.	Y	5	4	4
A networked app that lets you record incidents and track your bio data, pings allies to stand up for you when things get extreme (e.g., high blood pressure).	Y	5	4	4
A Cyrano de Bergerac app that gives advice on what to say and how to speak up for yourself during racism.	Y	3	5	2
A Cyrano de Bergerac app that listens for racism, asks questions, and then speaks up for you during racism.	Y	3	5	4
A text message app that allows you to attach emotion to text via sound, image, visual design.	Y	1	2	3
*A smart watch ally that detects racism, monitors your reaction, documents and gives advice.	Y	4	4	3
An incident logger to track consequences and stakes of reactions, compare to others, get recommendations.	Y	4	4	4

*An alarm that detects racist speech, is deactivated by perpetrator, prints out educational material.	Y	5	5	3
An augmented reality device that shows pop-ups when someone says something racist.	Y	4	4	4

Table 6.1. Final 13 storyboard design descriptions with ratings for the final assessment include: whether or not the coping is for after racism, reducing uncertainty, fit into vignette, and uniqueness. The last three items were assessed on a scale from 1 (low) to 5 (high).

6.1.2 The Final Design Provotypes: Intervention, Solidarity, or Comfort

The final three concepts we arrived at offered different types of support for coping with a racist interaction: from the most overt and most authoritative about the racism occurring– a Racism Alarm that declares that racist speech has occurred, to subtle support through a Smartwatch Ally that detects your own physiological response to an interaction, and finally a Comfort Speaker that is not involved in the interaction, but offers a range of personalized support when the recipient returns home. The following descriptions reflect our understanding of the value and complexities of the design concepts before final testing. The next section will describe how participants in the surveys responded to them.

Racism Alarm

The Racism Alarm is an amalgamation of several suggestions from participants in the sessions. In this form, the university (that our main character attends) has installed these racism detectors in public spaces. The alarm is constantly listening for racist speech and sounds an alarm when racism is detected. The alarm can only be shut off by the voice that made the racist comments saying, “I’m sorry.” Then a strip of paper is printed out with contextual information about why the comments were racist.

This design embodies the “Use Data to Validate my Experiences,” “When Racism Happens, Intervent on my Behalf In-the-Moment,” and “Relieve the Burden of Explaining Myself” design themes. Perhaps the strongest value of the alarm is that it is a neutral player in the conversation and interrupts the racism interaction on behalf of the target, but without any responsibility from them. In other words, it does not rely on Sam’s to interrupt or inform Dr. Avery that what is

being said is offensive. Additionally, the alarm both judges and confirms that the language is racist and provides an explanation about why– both of these are burdens that typically fall to the people of color in the interaction. In the discussions and storyboards, participants expressed frustration that many people do not understand why something is racially biased, and that they have trouble making a strong argument about why. Nonetheless they want people to learn more to understand why certain speech is harmful. In one storyboard, a participant drew a lock for people's phones, one that would say, "Phone will unlock after you are educated about the racial offense. Read below." Another participant sketched an "Implicit bias identifier app" which listens and detects implicit bias statements and then offers information from a history database about the statement and shares advice on how to challenge such statements.

While the concept of the Racism Alarm addresses those themes it also creates a few other issues. This is the concept that gives the least amount of agency to the target of racism. If Sam would prefer not to disrupt the conversation and educate Dr. Avery about the microaggressions she is committing, Sam is not given a choice about this. Sam will likely have to engage in the interaction around the alarm, whether they want to or not. There are the additional technological concerns about a speaker that is always listening in a public university space, and how well racist language can be detected in conversation.

Smartwatch Ally

The second concept, the Smartwatch Ally, that measures the wearer's stress signals and offers suggestions to intervene in the moment, reflects a combination of ideas from the PD participants. In the PD sessions there were many expressions of concern about the uncertainty of knowing what to do during a racist interaction. They imagined different ways to prepare themselves with information before hand, to talk with friends and online communities after an incident, and also ways that technology could analyze and offer advice while a racist interaction was occurring. In the concept we devised, an app would be installed and setup on a smartphone and watch. It is specifically targeted to offer help during racist, sexist, or homophobic incidents. The owner would teach the app to detect the emotionally charged voice of the wearer. Then, in moments when pulse and heart rate rise, the watch would listen and analyze the situation and offer advice on how to handle it. In this way, the wearer has agency over how much the intervention engages

with the situation. If the wearer wants support, they have the option to 1) record the moment, 2) receive a phone call to diffuse the situation, 3) receive advice on what to say in response to the racist speech, 4) ping an "Ally" to intervene.

Like the alarm, the Smartwatch Ally embodies the themes "Use Data to Validate my Experiences." The Smartwatch Ally also incorporates "Leveraging Data to Gain Advice with Certainty About Consequences and Stakes." Although less central to the interaction (as users can choose whether or not to take advantage of it), the Smartwatch Ally also "Prioritizes my Comfort and Protection." The concept of the watch that offers specific advice for this situation responds to the concerns from participants about feeling uncertain about how to engage in the situation and their disappointment that no one else in Sam's lab group spoke up for Sam during Dr. Avery's inappropriate interrogation. In their storyboards, participants drew ways for Siri to listen and intervene with options, and then follow up questions about how that intervention went for them, asking, "Should we recommend that again next time?" Or a complex algorithm that calculates the context and potential outcomes of any intervention and offers up the best action in the moment. In the final scene, Sam thinks, "I am happy that I have not ruined my career opportunity and made the best decision in that situation."

Additionally, shifting the agency from an objective, but independent alert system toward one where Sam decides when and how to intervene addresses many comments from participants that, depending on the situation, they may prefer not to address a microaggression in a group, while it is happening, especially with someone who is in a position of authority or professional connection.

Comfort Speaker

The third concept is adapted from a storyboard created by a participant in the second PD workshop. She was inspired by conversations about personalized coping and comfort and drew a Google or Alexa type smart speaker that would greet Sam at the end of a hard day and offer personalized support. In her storyboard Sam arrives home to their dorm room and says to the speaker, "Ugh, today sucked. I'm so frustrated!" The speaker asks, "What happened?" and immediately diffuses sage oil to comfort. Sam explains, "This guy said something ignorant and I

just lost it! I feel embarrassed." The speaker, which is shaped like a small cartoon figure, responds, "It's not your fault! What can I do to help you feel better?" Sam suggests, "Tell me a story?" The final scene depicts Sam, relaxing in bed, with dim lights, and the speaker describing a day from Sam's past when she got scones with John. In this concept, there is nothing to be done in the moment of the racist interaction, but technology is there to listen, support, and soothe after something upsetting has happened.

The Comfort Speaker most embodies "Make Technology that Prioritizes my Comfort and Protection" and "Help Me Digitally Express Emotions and Receive Emotions." In our version of this concept we also drew from another participant's storyboard who imagines an app that learns your personal preferences for how to be comforted after a frustrating event (e.g., distract me, play music, create a soothing environment for me to do a guided meditation, etc.). Another participant drew an interaction with an app that was simply a place to rant and then dismiss that rant into the ether. Which speaks to the desire to express frustration and anger as a coping mechanism and the benefit of technology as a neutral listener.

Integrating Provotypes into the Interactive Narrative

We took the original racial microaggression vignette from the Foundational Fiction method and chose multiple scenes to integrate the design provotypes. For each design, we selected one scene to introduce the technology (e.g., you select your favorite scent for the speaker to deliver at home before going to the cafe) and one scene where it would explicitly be used to cope with racism (e.g., when you come home after the cafe, the speaker asks how you are, if you would like to talk, and it deploys that favorite scent selected earlier).

After writing the narrative, we developed the story in the Twine platform. For each usage decision participants make, we embedded variables to track the choices made throughout the narrative (Freedman et al., 2018). We performed multiple rounds of pilot testing for feedback and iteration for readability, understanding of the design provotypes, and functionality of the study protocol.

Here are core moments the Racism Alarm appears in the vignette, during the conversation with Sam's lab group and visiting professor, Dr. Avery (Table 6.2):

Racism Alarm Vignette Scenes
"I completely agree with Professor Smith!" Dr. Avery exclaims. "It looks like you've given this a lot of thought, Sam, and your English is so advanced; you're so articulate. I know you'll go far!" A red light on the table starts to blink. It's coming from the little device. It's the size of a salt shaker. It seems to be buzzing too. *buzz buzz* [["Actually, English is my first language"]]
"Oh thanks Dr. Avery. English is my first language, actually." Unphased, she replies, "oh really? I was wondering why you didn't have an accent. Where are you from?" *Bwap! Bwap!* An alarm is sounding now. It's coming from the table! The red light gets brighter, now it's like a small fire engine, and it sounds like one too. Professor Smith grabs the placard and starts reading it. "Go on, sorry let me see what's wrong with this thing."
"Oh, I'm from the west coast," you shout over the sound of the alarm. "Hm," she ponders, "how about your parents? Where are they from?" Dr. Avery continues, though she has to lean toward you and shout to be heard. *BWAAAAP BWAAAAP BWAAAAAAAAP* "Ugh, sorry, Avery, I think this alarm is directed at you." Professor Smith clears his throat and looks apologetic. "It's a system the university has installed. It is to detect racist speech and microaggressions." Dr. Avery looks shocked. Others in the cafe are turning to stare. The blare of the alarm can be heard across the room now. *BWAAAAP BWAAAAP BWAAAAAAAAP* "But what did I do? I didn't say anything racist? Why would it be doing this to me?" She looks at you... [[Shrug]] [[Defer to Prof Smith]] [[Suggest it's broken]] [[Explain what bothered you]]
You glance at Professor Smith. "What does the placard say?" *BWAAAAP BWAAAAP BWAAAAAAAAP* "We're ok!" shouts Professor Smith to the device, grasping the placard, "I'm sorry!!" *BWAAAAP BWAAAAP BWAAAAAAAAP* "Hmm," Professor Smith turns to Dr. Avery, "the card says an apology from the person who triggered it will turn it off. Can you give it a try?" Dr. Avery tentatively leans forward and says, "I'm sorry." It quiets. Everyone breathes a sigh of relief. A strip of paper is being printed out. Dr. Avery looks at the others at the table and then slowly grasps the paper. She reads it out loud. "'You have committed a racial microaggression.' What

is that?" She pauses and looks up. Dr. Avery continues to read, "When you compliment someone on their English, or tell them they are articulate, without knowing their background, you have assumed something about them based on the way that they look." She stops reading. "Oh, I was just trying to make conversation!" [[Smile encouragingly]] [[Look down]]
You glance at Professor Smith. "What does the placard say?" *BWAAAAP BWAAAAP BWAAAAAAAAP* "We're ok!" shouts Professor Smith to the device, grasping the placard, "I'm sorry!!" *BWAAAAP BWAAAAP BWAAAAAAAAP* "Hmm," Professor Smith turns to Dr. Avery, "the card says an apology from the person who triggered it will turn it off. Can you give it a try?" Dr. Avery tentatively leans forward and says, "I'm sorry." It quiets. Everyone breathes a sigh of relief. A strip of paper is being printed out. Dr. Avery looks at the others at the table and then slowly grasps the paper. She reads it out loud. "'You have committed a racial microaggression.' What is that?" She pauses and looks up. Dr. Avery continues to read, "When you compliment someone on their English, or tell them they are articulate, without knowing their background, you have assumed something about them based on the way that they look." She stops reading. "Oh, I was just trying to make conversation!" [[Smile encouragingly]] [[Look down]]
Dr. Avery reads the rest of the information in silence. "Ok, I see." She says quietly and puts the paper down on the table. "Anyway, let's move on," suggests Professor Smith. "Regarding your future plans, if either of you need any further consulting, you know how to reach me. But I see that Dr. Avery needs a refill. Let's take a short break." Professor Smith and Dr. Avery leave to get refills. Luis says, "Wow that was really awkward, but gosh, Dr. Avery seems so helpful doesn't she? I'm still excited to get to talk to her more."

Table 6.2. Excerpts from the alarm vignette including core moments where the participant uses or encounters the alarm provotype.

Here are core moments the Smartwatch Ally appears in the vignette, during the conversation with Sam's lab group and visiting professor, Dr. Avery (Table 6.3):

Smartwatch Ally Vignette Scenes
Mia had sent a couple links yesterday for some new apps that you downloaded but hadn't had the time to look at just yet.

One app catches your eye, "Ally Watch." This tool for your smartwatch claims to detect your emotions and offer advice when you're stuck in awkward or hurtful moments. Mia said it's been especially useful for friends who deal with sexism, racism, and homophobia. You're skeptical, but interested.
Ally Watch starts up and requests to access your calendar and address book. Then it asks that you say a few words to calibrate your voice. It asks for you to speak first in an angry voice, then a scared voice, a startled voice, and a laughing voice - to learn your emotion signals.
"Oh thanks Dr. Avery. English is my first language, actually." You feel your smartwatch start to buzzzzz bzz bzz as your pulse begins to race. Unphased, she replies, "oh really? I was wondering why you didn't have an accent. Where are you from?"
"Oh, I'm from the west coast." Your watch buzzes again and you look down at it. It's the new app. A question pops up on the screen. "You seem to be getting upset. Do you want me to start capturing what is happening?" [[Press 'Yes, record']] [[Press 'Listen, don't record']] [[Shut it off!]]
[Record Option] A little red light blinks on the watch face. "Hm," she looks thoughtful, "how about your parents?" Your watch grabs your attention again, “These are inappropriate questions. Would you like help?” [[Ring my phone]] [[Contact an ally]] [[I'm fine, ignore]]
[Phone Ring Option] Your phone, deep in your pocket, rings out loud. You're sure you had set it to silent. “Oh! Excuse me.” You say, as you fish your phone out of your pocket. It reads 'Ally W.'. “I have to take this, sorry!” You step away from the table and put the phone to your ear. “Hello?” A recorded message responds. “This is Ally Watch. Thank you for using our service. This is a recorded message. You can talk to us as long as you like, if it helps you get out of a difficult situation.” You nod and smile in case anyone from the group is watching you. You take a few minutes to let your nerves settle. [[Head back to the table]]
[Contact Ally Option] You select the option to “Ping an ally” even though you don’t quite know what will happen. Who does this app think is an ally? Mia’s watch buzzes, she glances down at it and then at you.

“Ah, Dr. Avery, have you ever been to the Bay Area?” Mia interrupts the questions from the visiting professor. She continues, “There are lots of new companies starting up in that area.” “Oh, yes, of course, “ Dr. Avery responds, turning away from you and looking at Mia, a bit puzzled. “I think I’d like to work there someday...” Mia responds, trying to keep Dr. Avery focused on her. “Which companies do you think are the best to work for in San Francisco?”

Table 6.3. Excerpts from the watch vignette including core moments where the participant uses or encounters the watch provotype.

Here are core moments the Comfort Speaker appears in the vignette, when Sam returns to their dorm room after the comments and questions about where Sam is from, made by the visiting professor, Dr. Avery (Table 6.4):

Comfort Speaker Vignette Scenes
You head to your room to drop off your bag. Your smart home speaker lights up. You’ve been meaning to set it up for a while now, some friends from back home have them and they said it was super comforting when they were stressed. “He-llo SAM,” it says in a robotic voice, “are you ready to get set-up? Please choose a voice setting and I will be ready to assist you.” [[Lapis, the neutral voice]] [[Jet, the male voice]] [[Opal, the female voice]]
"Thanks Sam! I'm Lapis. I'm here for whatever you might need, whether it’s sending messages, setting up lighting and music in your room, to just chatting.” Lapis asks for permission to access your favorite music, as well as your contact list. Finally, Lapis asks, "what scent would you find the most relaxing?" [[Lavender]] [[Fresh Linen]] [[Cucumber Mint]] [[Cedar]] [[Chocolate-Chip Cookies]]
"Great! When you're feeling stressed, I'll infuse the room with the scent of cucumber and mint. That's all for now to set-up. Let me know if you need anything!" Lapis's light dims.
When you finally reach home you head straight to your room and flop down on the bed. Looks like Morgan headed out for a bit, probably to the library to get some studying in. Your speaker on the nightstand, Lapis, lights up with warm yellow light. "Hello Sam, how are you?" [["I'm fine"]]

[["I'm sad"]] [["I'm excited"]] [["I'm angry"]] [["I'm exhausted"]]
"Not so great, I'm kind of upset actually." "I'm sorry to hear that. I have some suggestions. I could help you call a friend, or maybe play some relaxing music? Or if you want to just vent to me, I'd be happy to listen to what happened today. What would you prefer?" [[Talk to Lapis]] [[Call Mom]] [[Text Ashley]] [[Listen to music]] [[Turn off for now]]
"It'd be nice to talk, yeah." "What's on your mind?" You spend the next half hour talking and venting about everything that happened today as well as the other stressors on your mind. Lapis listens, chiming in here and there to offer comfort and support. You smell the faint scent of lavender and feel yourself relaxing. It was a pretty busy day and you still have hours of homework tonight and a test next week. Maybe you can catch a quick nap before digging in for the night.

Table 6.4. Excerpts from the speaker vignette including core moments where the participant uses or encounters the speaker provotype.

6.2 Methods

To evaluate our design provotypes, we conducted user tests using the adapted Foundational Fiction vignette with 42 participants across the three provotypes. Below I detail our recruitment, study procedures, and data analysis.

6.2.1 Recruitment

Participants were recruited through Amazon's Mechanical Turk (MTurk) platform which has previously been used as a reliable resource for running user studies (Mason & Suri, 2012). An initial eligibility HIT was made available to workers in the USA who were older than 18 with an approval rate of at least 90% to increase the likelihood of response quality (Peer et al., 2014).

The HIT included a filter question - participants were asked their racial/ethnic identity in an open response question. If they identified as a person of color they were eligible for the study.

In total, 47 participants completed the study across the three conditions (alarm, watch, speaker). In order to further assure quality, we evaluated attentiveness. We included a simple multiple-choice reading comprehension question (*What was Sam's roommate's name?*) both in the middle of the vignette as well as in the post-vignette survey to help flag data that may have come from inattentive participants. We also examined three open response questions to evaluate whether or not participants provided meaningless or nonsensical answers. After data cleaning, 42 participants remained for analysis (14 alarm, 15 watch, 13 speaker).

6.2.2 Participants

Participants were adults who belonged to a wide variety of racial and/or ethnic minority backgrounds (18 women, 24 men). After completing the consent form, participants were randomly assigned to one of the three design provotype conditions (alarm, watch, speaker).

Fourteen participants were assigned to the alarm condition (6 women, 8 men), fifteen were assigned to the watch condition (7 women, 8 men), and thirteen were assigned to the speaker condition (5 women, 8 men). The age distribution varied slightly across the alarm (M=33.8, SD=8.4), watch (M=26.3, SD=5.8), and speaker (M=29.5, SD=7.1).

As with gender, participants self-identified their racial/ethnic background in an open response. For this report we coded responses into five major demographic categories. Participants who identified as belonging to multiple groups were counted multiple times for the specific groups but were not additionally counted as multiracial. 18 participants identified as Asian or Asian American, 8 as Black or African American, 11 as Hispanic or Latinx, 3 as Native or Indigenous, and 3 as Mixed or Multiracial. Distribution across the conditions was roughly even.

6.2.3 Study Procedures

Participants were introduced to the study via MTurk HIT which disclosed that they would be asked to "Read through an interactive (choose-your-answer) story and complete a survey with your opinions about the story." They were informed that the purpose of the study was to understand "how people interpret different social interactions, including prejudice and bias." After accepting the HIT on MTurk, participants were led to a consent form that included more detail about the study procedure and requirements. After providing informed consent, participants were randomly sent to one of the three design condition vignettes hosted online.

Design Provotype Vignette

To onboard participants who may be unfamiliar with interactive narrative, the vignette opens:

> *"This is an interactive story, which means you will read the story from the perspective of the main character, Sam, and make choices as Sam. There are no right or wrong answers. Some of the situations in the story may be socially uncomfortable and/or involve bias or prejudice."*

To attune participants to the designs and prepare them for the non-existent/speculative nature of the designs they also read that, "in the story, you will encounter and have the opportunity to use a futuristic, fictional technology."

Participants read through one of three versions of the racial microaggression vignette as detailed in 5.9.2). At the end of the story, they clicked a link that took them to a final survey. The survey had three main purposes: 1) evaluating reception of the design provotypes, 2) evaluating how participants perceive racism in the story, and 3) evaluating participants' emotional experience throughout the story.

Understanding the Design Provotypes

In seeking feedback and evaluating the designs, we took both a user-centered design research and playtesting approach. In user-centered design, we seek to understand how our design might fulfill perceived needs of users as well as how practical and usable it might be (Shneiderman et al., 2016). In playtesting designers solicit formative feedback about an in-progress artifact in

ways that might focus on outcomes, but may also focus on joy and understanding (Fullerton et al., 2004).

We ask participants: 1) to describe how the technology works, 2) to describe what the technology is intended for, 3) what they like best about the technology, 4) what they would change about the technology, and 5) if there is anything else they want to share with us about the technology.

Perceptions of Racism

Our prior work indicates that certainty about the nature of a racist event is one of the first and more critical components of coping with racism (To et al., 2020). To assess how participants use the designs to cope, we needed to understand whether or not they even noticed racism in the vignette, what their perceptions of the conversation at the cafe are, and their impressions of the characters as relates to racism. We focus character questions on Sam in order to evaluate how much they might relate to the first-person character they embody, as well as Dr. Avery, the professor who says the racist comments and Professor Smith as a relatively good baseline, as a professor with a similar power dynamic in the story, but who does not say anything overtly racist (though some have read his character to be complicit as someone who does not confront or acknowledge Dr. Avery's comments).

First we ask participants in an open-response question what their impression of three main characters, Sam, Dr. Avery, and Professor Smith are. Next we ask them to rate their agreement with the statement "I have a good impression of [character]" on a scale from 1 - strongly disagree to 7 - strongly agree.

Next we asked participants about their perception of racism in the conversation during the cafe. We found in prior work that people tend to use coded language to talk about racism, tending to soften the blows of racism by saying, "they meant well," or "I think it was just ignorance." To that end we ask increasingly pointed questions about racism to give space for different comfort levels in ascribing racism, while still allowing us to understand whether or not the participants identified the microaggression. They rate agreement from 1-7 with: "Dr. Avery meant well," "Dr. Avery did not mean well," The comments Dr. Avery made to Sam were racial

microaggressions," The comments Dr. Avery made to Sam were racist," and "The comments Dr. Avery made to Sam were not racist."

Finally we ask about their ascriptions of racism to the characters. Here we differentiate from "the comments were racist" and "the person is racist." Participants rate from 1 (not at all) to 7 (extremely) the extent to which [Dr. Avery / Professor Smith] are: ignorant when it comes to race, racially biased, and racist (six total questions).

Emotional Experiences

Because we are interested in the coping process following interpersonal racism, we pay particular attention to how participants emotionally experience the vignette through the first-person character Sam. We asked participants to choose up to three core emotions from a predetermined list (plus an open-response other option) Sam felt before, during, and after the meeting at the cafe, as well as how the design they encountered specifically influenced (or did not influence) Sam's emotions during and after the meeting at the cafe (e.g., "*How did the speaker make Sam feel after the conversation with Dr. Avery?*"). Informed by our prior interview study (To et al., 2020), we identified core emotions that come with experiences of racism (e.g., anger, anxiety) and emotions that come with healthy or productive coping (e.g., relief, amusement). We included emotions that represent the intent and/or impact of specific microaggressions (e.g., embarrassment, inferiority) (Sue, 2010). Finally, to ensure participants were not unduly influenced and to give them a range of choices, we filled in major emotions that were not yet represented from Gloria Wilcox's Feelings Wheel (e.g., happy, hopeful, sad) (Kelley, 2016). The complete list includes: amused, anxious, angry, calm, confident, confused, disgusted, embarrassed, happy, hopeful, important, inferior, irritated, relieved, sad, singled out, stupid, supported, unsupported, and other (__). Additionally, for the three non-design emotion questions, participants were asked to rate how strongly Sam felt the emotion from 1 - not at all strong to 7 - extremely strong.

Finally we collect demographic information. In order to understand potential meaningful differences in participants, we asked questions about participants' relationship with race and racism (e.g., whether or not they had experienced a racial microaggression, whether or not they

often have conversations about race and racism). We additionally asked when and if they had encountered interpersonal racism in the past 6 months, how they have reacted with a pre-set list informed by prior literature on common forms of coping (e.g., talk about it to a friend, post about it publicly, try to forget about it). Finally, we collected participants' age, gender, and racial/ethnic identity.

6.2.4 Data Analysis

For the qualitative data we performed a thematic analysis (Thomas, 2006) as well as evaluative coding (Creswell, 2007) of the descriptive, open-field response. Thematic analysis was used to look for underlying themes in reception of the three designs. Evaluative coding was used for the impressions of the three characters Sam, Dr. Avery, and Prof. Smith to assess perceptions of prejudice and good intentions.

For the quantitative data, we used non-parametric tests on both the Likert scale and check-all-that-apply emotion data. In the Likert scale for interpretive purposes we coded scores from 1-2.99 as disagreement, 3-5 neutral (neither agree nor disagree), and 5.01-7 as agreement.

6.3 Results

In this section I describe the results from participants' experiences of the three design provotypes as delivered through our adapted interactive vignettes. First I share how participants generally reacted to and described and interpreted our representation of the design provotypes (5.11.1), followed by their specific reactions to the Racism Alarm (5.11.2), Watch Ally (5.11.3), and Comfort Speaker (5.11.4). I then present findings in how the designs may have impacted participants' perception of racism in the narrative (5.11.5) as well as their emotional experience of the narrative (5.11.6).

6.3.1 Perception of the Design Provotypes

Participants in the final sample were able to navigate and complete the interactive vignette - as evidenced by their completion of the survey and reading comprehension of the story in

open-response questions. They recalled key story elements, had formed meaningful impressions of characters, and were able to provide meaningful descriptions of the designs. For example, W15 said this of Sam, "*I felt like Sam is a hard worker, but it seems like he has to work harder to please other people. I feel like he's experienced other people judging him or assuming things about him due to his ethnicity/how he looks*" and described the watch as, "a*n app that evaluates your pulse and possibly voice to detect your emotions. It will then send you some advice whenever you are in an awkward or stressful situation*." Participants were engaged with the narrative, were able to comprehend the designs at a high-level, and made interesting inferences about the details of how they worked and what they were for.

We found that participants across all conditions who indicated that they had not had experiences with racism in the past 6 months (n=8) were less likely to indicate that they would use the technology proposed in the vignette. We observed no difference in affinity for any of the designs based on how they might typically respond to racism (e.g., passive vs. assertive).

6.3.2 Racism Alarm

Participants perceived that the Racism Alarm's main purpose was to alert someone who is speaking that their language is racist - to detect it and make it known. The target user was positioned as the offender, with some indication that a university may also be interested in monitoring racist speech.

Participants liked that it made people aware of racist speech and that it included a description of what exactly was said that was offensive. A5 felt that the alarm could be a good co-conspirator, "*I liked that it can speak up for someone who is shy.*" A2 liked that it educated in the moment, "*it makes people aware of when something someone said could be hurtful.*"

The Racism Alarm also received a significant amount of backlash from participants. They disliked how disruptive it was and desired for the alarm to communicate more clearly to everyone in the vicinity why certain phrases are considered racist. A7 felt that the noise would worsen the situation,"*the alarm going off may cause more problems since it can affect the person*

it's trying to help. A beep and the print out of the issue should be enough." A13 indicated that they would be embarrassed by the alarm, "*I would not want to create a scene.*"

At least a third of participants felt that the Racism Alarm was "pointless" and that it was more about preventing people from being offended than from actually preventing harm.

> "*[I liked] nothing, I think the alarm was way too sensitive and may have made the person feel uncomfortable where he wasn't initially.*" -A12

Participants who indicated that they had not had experiences with racism anytime in the previous six months were the most likely to have strong negative attitudes towards the alarm. Relatedly, these participants tended to indicate that racism was a political issue and that in general, people who label things as racist are overly sensitive. Given what we know about how racism operates in the U.S. (e.g., that anyone from a racial minority background is likely to have experienced racism) and that all participants had identified as belonging to racial minority groups, this may be a manifestation of internalized racism (i.e., internalized beliefs that uphold white supremacy and reinforce one's own oppression).

6.3.3 Watch Ally

Participants perceived that the Watch Ally's main purpose was to detect your emotions and offer advice. Specifically, its purpose is to directly serve the user in bad situations; it is aware of racism but is largely focused on your negative emotional reaction to racism. Users were very likely to use language specifically from the description of the watch in the before-the-cafe scenes, citing that it would be helpful for racism, sexism, and homophobia.

We saw variation in how participants chose to use the watch in the vignette. After the first prompt, 3 of our participants chose to turn the watch off, which prevented them from experiencing its other capabilities. After the second prompt, 8 participants chose to ignore the alert and dismiss it, while 2 chose to contact an ally and another 2 chose to ring their own phone.

Participants liked that the watch gave you multiple choices about whether and how to use it. They liked how discreet the watch was, that it assisted you directly, and that it provided agency.

W2 noted, "*it seems like it's fairly discrete [sic] since it only offers advice when prompted.*" Two participants explicitly called out how valuable it was that the watch provided validation and certainty:

> "*[The watch] confirms that the other person is being inappropriate, not that yourself are being too sensitive.*" - W9

At the same time, participants disliked how disruptive the watch could be. Some participants felt that the watch should automatically record (rather than asking) when difficult situations arose, while others felt that the choice was necessary. Some desired to set more preferences in advance - they tended to think it would be difficult to multitask or make decisions in the middle of a conversation.

> "*I would have an option for pre-setting it so that it doesn't interrupt an important meeting.*" -W15

Only two participants indicated that they had not experienced racism in the past six months, but both tended to give the watch negative ratings. The other participants ranged from neutral to positive impressions.

We noticed a slight effect towards gender in the watch responses. Women tended to view the watch more positively than men. Men tended to have neutral opinions, but also indicated that the watch was not useful to Sam in the vignette.

6.3.4 Comfort Speaker

Participants perceived that the Comfort Speaker's main purpose was to be a smart assistant whose core task was to be a companion - to both assist with necessary tasks but also to provide comfort.

> "*[The speaker's purpose is] to relax people and calm them down by removing their stress. I think it would be nice to vent and feel like there is someone actually listening to what you have to say.*" - S3

In these descriptions, participants did not explicitly mention racism, but did indicate that having a companion that could "talk about difficult things" or "really understand me" would be useful and powerful.

Despite being provided three options for a "voice" for the watch speaker, we saw that participants only chose Lapis, the neutral voice or Opal, the female voice. None of the thirteen speaker participants chose Jet, the male voice.

Participants liked that the speaker was supportive. "*I liked that it wasn't overly imposing/dictatorial and actually provided Sam with a myriad of options as noted above. Life is all about options,*" S10 wrote. They also enjoyed the multimedia support - scent, music, lighting, and conversation.

Participants offered no criticism of the speaker and instead offered suggestions for expanding its existing features. Some wanted to extend its therapeutic aspects, while others expanded on features they have come to expect from smart speakers on the market today. Despite this connection to existing technologies, participants tended to describe the speaker as a virtual companion, rather than as a tool.

6.3.5 Perception of Racism in the Vignette

In order to assess whether or not the participants perceived racism and/or racial microaggressions in the story, we asked both open-ended and close-ended questions about their perceptions of three of the main characters: Sam, Dr. Avery - the visiting professor, and Prof. Smith - the supervising professor, as well as the conversation at the cafe. In order to avoid leading participants in specifically identifying racism, we begin with broad questions and become increasingly more pointed and narrow.

We created an evaluating coding schema for both Dr. Avery and Prof. Smith to compare the two most related characters' impression data. "Prejudice" was coded for the participant's response if they mentioned that the character had any bias, ignorance, prejudice, or other indication that the character makes unfounded assumptions about other people. Participants were most likely to say that Dr. Avery was prejudiced in the watch condition compared to the alarm and the speaker conditions (Figure 6.1). However, they were more likely to say that Prof. Smith was prejudiced in the speaker condition compared to the alarm or the watch (Figure 6.1). "Well-intentioned" was coded for any mention of kindness, helpfulness, good intention, or other indications of

benevolence or wishing good upon others, despite the impact of actions. Every participant across all three conditions said that Prof. Smith was "well-intentioned" (Figure 6.1).

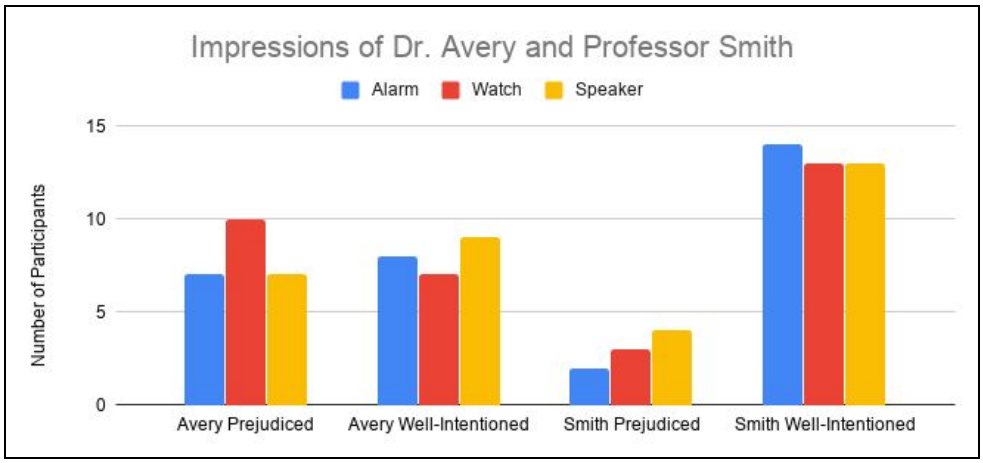

Figure 6.1. Number of participants in each design condition who described the characters Dr. Avery and Professor Smith as prejudiced and/or well-intentioned.

Participants in the speaker condition were significantly more likely to agree that they had a good impression of Sam as determined by One-Way ANOVA ($F(2, 39) = 3.434$, $p = 0.04$) (Table 6.5). We do not observe a statistically significant difference in agreement of good impressions of Dr. Avery with One-Way ANOVA ($F(2, 39) = 1.190$, $p = 0.31$) nor for Professor Smith ($F(2, 39) = 1.431$, $p = 0.25$) (Table 6.5).

	Good Impression of Sam	**Good Impression of Avery**	**Good Impression of Smith**
Alarm	5.50 (1.16)	4.00 (1.84)	5.36 (1.22)
Watch	6.13 (0.83)	3.67 (1.23)	5.33 (1.11)
Speaker	6.38 (0.65)	4.62 (1.80)	6.00 (1.15)

Table 6.5. Average rating and standard deviation of agreement (1-7) of good impression of characters.

	Avery Meant Well	Avery Did Not Mean Well	Comments Were Microaggressions	Comments Were Racist	Comments Were Not Racist
Alarm	4.79 (1.72)	2.86 (1.70)	4.50 (2.21)	3.86 (1.92)	3.71 (2.30)
Watch	4.40 (1.24)	3.87 (1.64)	4.33 (1.63)	3.87 (1.60)	3.87 (1.13)
Speaker	4.69 (2.14)	2.77 (2.28)	4.38 (2.18)	3.62 (2.10)	3.77 (2.20)

Table 6.6. Average rating of agreement (1-7) with assessment of comments at cafe.

Although the average response to each of the assessment questions fall roughly in the 'neutral' category (Table 6.5, Table 6.6), from the high standard deviation we can see that there is a wide spread of responses and that the average may be misleading. This informed another set of analyses later in this section, examining how different pools of participants within the design conditions might differ meaningfully from one another, influencing how they react to either the narrative, the design provotypes, or both.

	Avery Ignorant About Race	Smith Ignorant About Race	Avery Racially Biased	Smith Racially Biased	Avery Racist	Smith Racist
Alarm	4.57 (1.83)	2.86 (1.41)	4.14 (1.96)	2.57 (1.45)	3.29 (1.49)	2.14 (1.35)
Watch	4.73 (1.53)	2.80 (1.66)	4.27 (1.58)	2.67 (1.59)	3.53 (1.41)	1.87 (1.46)
Speaker	4.54 (2.15)	2.62 (1.71)	4.15 (1.86)	2.46 (1.76)	3.38 (1.80)	2.08 (1.50)

Table 6.7. Average rating of agreement (1-7) with assessment of characters.

In the alarm condition, participants are significantly more likely to agree that Dr. Avery is ignorant about race ($M = 4.57$, $SD = 1.83$) than Professor Smith is ignorant about race ($M = 2.86$, $SD = 1.41$), $t(12) = 2.53$, $p = .018$. They are also significantly more likely to agree that Dr. Avery is racially biased ($M = 4.14$, $SD = 1.96$) than agree that Professor Smith is racially biased ($M = 2.57$, $SD = 1.45$), $t(12) = 2.38$, $p = 0.026$. We also observe a trend across these assessment-of-character questions that participants tend to be more comfortable agreeing that a character is "ignorant about race" compared to "racially biased" or "racist." This aligns with

earlier observations in the participatory design workshops from chapter 5 which influenced our decision to include three different wordings.

We can also see how differences in perception of the vignette impacted how participants responded to the three designs. For example, participants who did not view the incident with Dr. Avery as being racist were more likely to have negative attitudes towards the watch (i.e., unlikely to think it is useful to Sam, that they would use it, or that others might use it) than those that did see Dr. Avery's comments as being racist.

Similarly, those participants who did not view Dr. Avery's comments as racist were the most likely to have strong negative reactions to the alarm.

6.3.6 Emotional Experience of the Vignette

In order to interpret differences in the emotional experience of the vignette, we first map our 19 pre-determined emotions into a valence/arousal space (Table 6.8).

	Negative Valence	**Positive Valence**
High Arousal	Anxious, Angry, Singled Out, Embarrassed, Irritated, Inferior	Happy, Amused, Relieved
Low Arousal	Confused, Sad, Unsupported, Disgusted, Stupid	Supported, Calm, Confident, Hopeful, Important

Table 6.8. Coding Valence/Arousal mapping of emotions.

For all three conditions, participants had the same most common emotions before the meeting at the cafe (Figure 6.2): happy, calm, and hopeful - all falling in a positive emotional valence with mid to low states of arousal. Speaker participants additionally frequently felt confident. Three watch participants felt anxious - the largest presence of any negative valence emotions before the cafe.

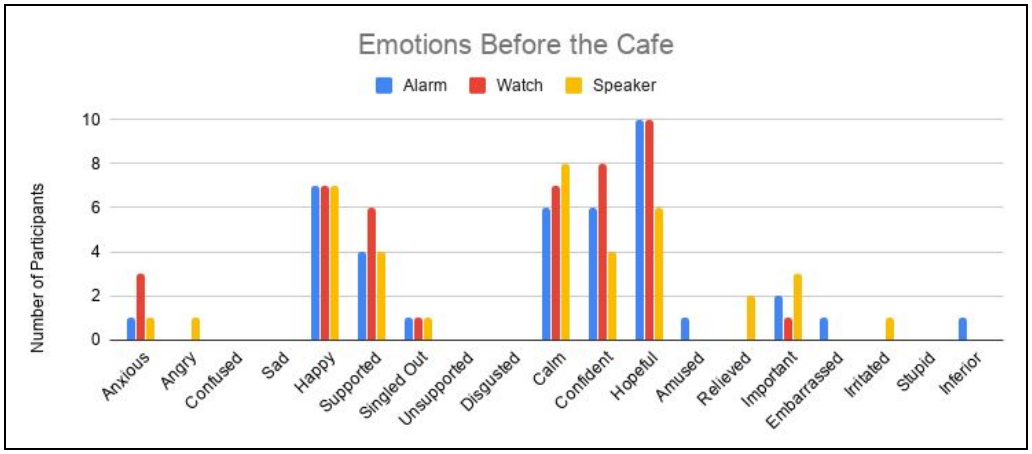

Figure 6.2. Bar chart with the number of participants who chose a given emotion as a top 3 emotion felt before Sam left their house to go to the cafe.

There is much more variance in emotions felt during the cafe (Figure 6.3). One of the most common emotions across all three conditions was supported. Distribution of emotions change when participants attribute emotions to the design provotypes (Figure 6.4). In the alarm condition, participants also commonly expressed that the alarm caused them to feel confused, embarrassed, and singled out (negative valence/mixed arousal). In the watch condition participants expressed that the watch made them feel irritated (negative valence/high arousal). In the speaker condition they commonly expressed that the speaker made them feel calm and relieved (positive valence/mixed arousal).

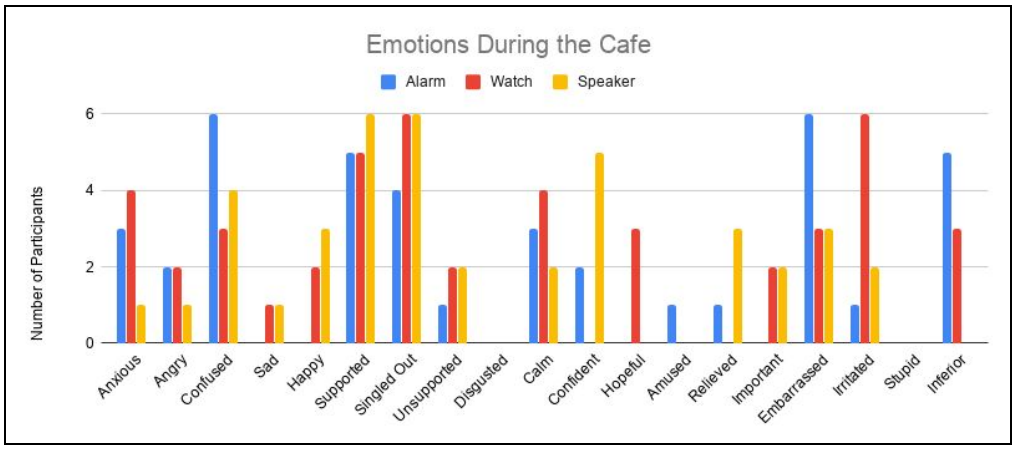

Figure 6.3. Bar chart with the number of participants who chose a given emotion as a top 3 emotion felt during the conversation with Dr. Avery at the cafe.

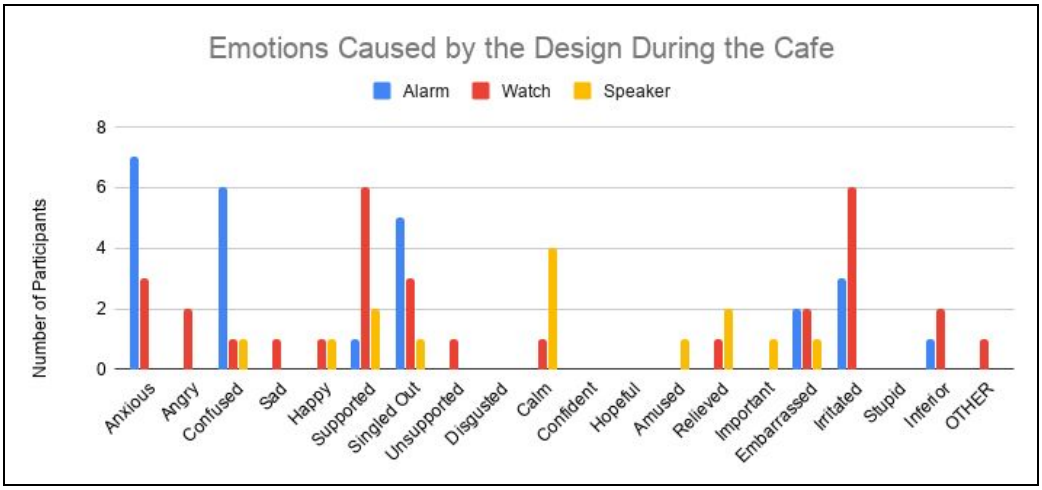

Figure 6.4. Bar chart with the number of participants who chose a given emotion as a top 3 emotion felt because of the design provotype during the conversation with Dr. Avery.

After the cafe, the watch and the speaker participants felt that the technology made them feel both calm and relieved (positive valence/low arousal). Speaker participants additionally felt supported (positive valence/high arousal). By contrast, the alarm participants continued to primarily feel that the alarm had singled them out (negative valence/high arousal). They additionally felt embarrassed, irritated, and inferior (negative valence/high arousal) and conflictingly both supported and unsupported.

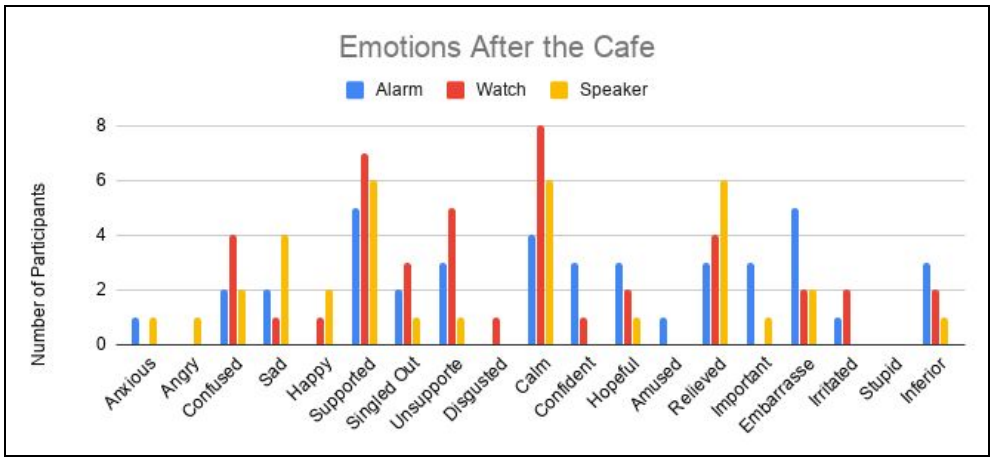

Figure 6.5. Bar chart with the number of participants who chose a given emotion as a top 3 emotion felt at home after the cafe meeting.

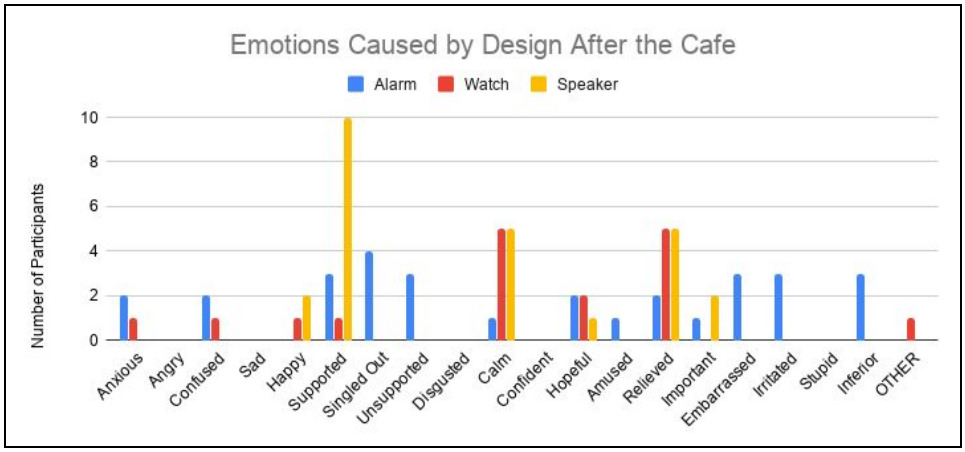

Figure 6.6. Bar chart with the number of participants who chose a given emotion as a top 3 emotion felt because of the design provotype at home after the cafe meeting.

6.4 Discussion

In the following section, I discuss the patterns that emerged in evaluating the designs provotypes and their impact on perceptions of racism and emotional experiences of racism. In particular, I focus on how the findings from the evaluations align with or conflict with their intent both on the part of the research team as well as the original participatory design participants from which the designs originated. I also discuss learnings from adapting the Foundational Fiction interactive vignette for user testing of design concepts.

6.4.1 Interactive Vignettes for User Testing

In our final sample, all participants' descriptions of the provotypes reasonably described the purpose of the technology as well as how it might work. While their affinity towards the designs varied widely, we saw that in using only a short amount of text (and no visual depictions of the technology), we were able to describe a speculative future in a way that was engaging and believable to our participants.

As we consider how this method might be adapted for conducting user testing at scale, we reflect on the process of writing the designs into the vignettes. The choose-your-own adventure style of an interactive fiction means that all choices by the participant must be pre-written. In our writing

we prioritized user agency as much as was appropriate. For example, we allow the user to turn off the watch when it first prompts Sam to record, but the alarm cannot be turned off by the user by design. However, even providing pre-written responses in an interactive fiction context still provides a substantially looser narrative structure than non-interactive narrative. Providing a branching structure where participant choices are (or perceived to be) meaningful encourages higher levels of engagement, identification, and enjoyment than traditional narrative (Green & Jenkins, 2014).

In our study we cared not only how users might perceive the provotypes, but also how they might interpret the social interactions through experience-taking with the character Sam. In that case, prioritizing user agency presented particular challenges. Specifically, we wanted to write Sam as a realistic and compelling character, but did not want to overly prescribe Sam's attitudes and feelings in order to leave space for the participant to make those decisions and to see themselves as Sam in the story. For example, we desired to know what the user might discuss with the speaker in the "vent" option, but chose to use mirroring language (e.g., you talk to the speaker and feel better) rather than prescriptive language (e.g., you tell the speaker about the comments Dr. Avery said at the cafe and explained why they made you uncomfortable).

Finally, as in chapter 5, the interactive narrative vignette was an ideal tool for delivering an experience with uncertainty to participants in a first-person perspective with the safety of psychological distance. Participants were able to utilize the design provotypes from a first-person perspective and we could easily observe, through both closed and open-ended response questions during and after the narrative, how the provotypes impacted participant certainty surrounding the racial microaggression.

6.4.2 Individual vs. Social Experiences Interpreting the Interactive Vignette

Across all three designs, we did not see any strong trends that participants were willing to call out racism specifically in the vignette, despite the fact that some designs explicitly call out and label racism. This mirrored the very beginnings of conversation in the participatory design workshops where participants read the same story with no fictional technology. However later in

the workshops there was often active, rich conversation about the nature of the racism in the story that often involved connecting the story to personal experiences. Participants in all three design conditions expressed either uncertainty about the nature of the racist conversation, or in a few cases, were in fact certain that the comments were not racist.

One explanation might be that these samples differ. PD participants responded to advertisements that asked them "do you have something to say about racism?" whereas design evaluation participants were MTurk workers who were invited to "complete an interactive story that may involve uncomfortable social interactions, such as bias and answer a survey about the story." We might expect that PD participants may have a higher comfort with discussing racism and that the MTurk participants may be more reflective of the general public. However, the majority of participants across all three conditions answered "yes" to the statement "I often have conversations about race and racism." MTurk participants may also relate less to Sam's story in particular and in future work we plan to measure experience-taking and other metrics of engagement and transfer with the narrative.

An alternate explanation is that the individual form of the design evaluation compared to the social form of the workshop means that participants have more limited chance for the kind of validation our technology seeks to encourage. Participants in the workshop receive social validation from one another, reducing their uncertainty both about the vignette but also about their ability to be open and honest about their experiences and interpretations of racism. Workshop participants are further reassured by the research team that their contributions are considered valid and informative. The MTurk workers, in a solo environment, do not have that opportunity and may be more reluctant to describe something as racist. At best they might be uncertain whether or not it is appropriate to label as racist, at worst they might be concerned about whether or not they will be punished for labeling something as racist (e.g., not paid for their work). For research that involves vulnerable and sensitive topics, replicating the assurances and validation that might happen in group and even in one-on-one interview contexts is more challenging at scale through the vignette user test.

6.4.3 Patterns from the Alarm

The alarm was the most poorly received by participants on all fronts. In the qualitative data we saw that participants felt it was socially awkward, uncomfortable, faulty and overly sensitive. In the emotion data we see that it causes embarrassment, confusion, and anxiety. Although we know from prior work and from the participatory design research that certainty has been one of the highest priority in coping, the alarm demonstrates that not all attempts to reduce uncertainty are valuable or even considered reliable. Participants in the workshops from chapter 5 indicated that both they and others in the scene might view technology as an authority in assessing whether or not something was racist. Instead, in the alarm provotype evaluations we see discomfort, awkwardness, and accusations of faultiness. Some participants went as far as to say that the alarm created an uncomfortable situation where Sam had previously been fine or had not noticed or experienced racism.

Furthermore, we saw themes that indicated that agency was a large factor in the alarm's reception. Sam did not have any choice in deciding whether or not racism was happening to them in the interaction with Dr. Avery and the alarm took away their choice in making that assessment as well as declaring it publicly. In experiencing anxiety and embarrassment, we might also extrapolate that this declaration of racism may have harmed Sam's future career opportunities from Dr. Avery. In some situations, we might imagine defensive and even violent backlash against public accusation of racism that places Sam, the target, in the most vulnerable position. There is no person actually there to mediate that conversation or anything that follows the alarm's deactivation.

Prior literature indicates to us that for many people (at least in recent years) being called racist is problematically considered worse than actually enacting racism (e.g., Srivastava, 2005; Vaught & Castagno, 2008). Some participants took a defensive stance in favor of Dr. Avery, who they perceived to have been unjustly put in an awkward situation. They reacted to the alarm's certain declaration of racism with certainty that the alarm was "too sensitive." Along with this ideology, we also consider that by failure of randomization, the participants who saw the alarm were on average older (M = 33.8, SD = 8.40) than the watch (M = 26.33, SD = 5.84) and speaker

participants (M = 29.54, SD = 7.10). There may be generational differences in how racism is defined as well as how it has been historically enacted (Ward, 1985). For example, microaggressions and subtle forms of racism may not be considered as 'valid' enactments of racism because they are unintended, unlike hate speech.

While we already knew, as the most "extreme" of the three provotypes that we would never suggest anyone build the Racism Alarm, we have learned much from evaluating it in-context.

6.4.4 Patterns from the Watch

In contrast to the alarm, the watch was received neutral to slightly positively by participants - they did not tend to have strong opinions for or against the technology. This was surprising to us as the watch was most meant to align with what participants had both proposed directly in the PD workshops as well as expressed thematically in our analysis of the designs. The watch detects racism, validates that racism is happening, provides direct advice and options for a reaction, and facilitates multiple ways for a person to cope with the incident in-the-moment. It records when asked for potential later use.

Part of this tepid reaction may be conflicting desires amongst the sample population. For example, some participants believed the watch was overly disruptive and distracting - making it hard to multitask. Others felt that it was not providing enough options and should prompt Sam more to give choice in when and how to use it. We also saw that participants who were more likely to agree that Dr. Avery was racist or at least had made racist comments were more likely to view the watch favorably.

We consider that there may be a degree to which any technology that blatantly brings up racism may have an uphill battle in being received positively. Even though the watch as a tool might aid in coping for some people, just bringing up and shedding light on racism may bring up unpleasant feelings, spark remembrances of past personal experiences, and/or may be a painful learning moment. The watch does not necessarily validate a person's interpretation, after all, it does not ask for it. Instead it tells the user that racism is happening. It introduces certainty in a moment where a person may not even be aware of the uncertainty they are experiencing (e.g., in

cases where uncertainty-relevant anxiety may be felt but a person has not yet ascribed a trigger to that anxiety). Especially for people who are less familiar with the psychology of microaggressions, this learning in-the-moment may be difficult and unpleasant. The immediate certainty may not produce positive emotions in the moment, but may have long-term impacts that are helpful towards processing and coping. For technologists this brings up an important tension to be addressed as well as long-term research questions. Is a technology that creates an emotionally unpleasant user response that ultimately aids in coping and processing good? How might we design technologies that must raise difficult, but useful and productive topics in a sensitive manner? Whose job is it to decide for the user what is useful and productive? Participants from the workshops in chapter 5 repeatedly asked for technologies and interventions that educated them and prepared them, but finding the appropriate moment to intervene and educate remains challenging and presents many opportunities for exacerbating harm.

6.4.5 Patterns from the Speaker

The speaker was received positively across the board for participants. We did not receive a single direct criticism, but many users did provide feedback in expanding the set of capabilities and features of the technology. Participants liked the comforting nature of the technology and referenced how understanding and non-judgemental it might be. The speaker does not present certainty about the racist nature of the cafe conversation, but instead provides certainty that whatever emotional reaction Sam is having is the appropriate one.

The positive reception of the speaker may be because participants are more likely to have a direct comparison in mind when they are thinking of the speaker in their actual lives (e.g., Amazon Alexa, Google Home). In our usage data, despite providing three voice options (a masculine, feminine, or neutral voice) participants only chose between the neutral and feminine voice options. This aligns with prior research on gendered perceptions of conversational agents (e.g., Brahnam & De Angeli, 2012) and may be one indicator that participants have placed assumptions about those technologies onto the speaker. Additionally, the speaker is used much

later in the narrative than both the alarm and the watch, and positive reactions may be a result of a peak-end effect (e.g., Do et al., 2008).

Finally, in contrast to the alarm and watch, the speaker never mentions anything about bias or racism. Instead it simply reflects back what the participant might be thinking. While participants have the opportunity to vent to the speaker if they are upset, the vignette does not actually describe what is said - partly because it is difficult to simulate what Sam the character might say without unduly influencing the participant to ascribe racism to the conversation. Cynically we might take away that, as we have seen with technologies that use filter bubbles or echo chambers (El-Bermawy, 2016), that technology that reaffirms our world view and does not challenge us are easy to adopt and might create more pleasant user experiences emotionally. More generously we might see that the speaker shows a lens on personalization that does not reaffirm a person's experiences informationally, but emotionally and empathetically. Technologists looking to design for comfort and empathy should consider how the abundance of multimedia and emotional support choices offered by the speaker heightens agency while providing useful scaffolds for providing support to a person in distress. Towards designs with more conversational elements or where we may want to provide more open-ended prompts for participants, we might explore text adventure interactive fiction in expanding this method in future work.

6.5 Limitations

This data and sample have limitations. First, participants in the alarm condition were older than those in the watch and speaker conditions through a failure of randomization. The alarm is also the most blatant in naming and addressing racism. Negative reactions to the alarm may be an effect of age, the unsubtle nature of the provotype, or both.

The studies are also underpowered for observing differences in emotional, behavioral, and interpretive outcomes from using the three different design provotypes. However, the provotypes are not meant to be directly compared. The provotypes differ along so many dimensions (e.g., subtle vs. overt, made for target vs. perpetrator, whether or not the educate, whether or not they comfort, etc.) that it would be inappropriate to isolate any one variable to see how it might

impact coping. Instead, the purpose of this evaluation is to examine what factors and stakes might take priority when the design themes from the workshop are made concrete and used in-the-moment.

Due to restrictions of the interactive fiction method for evaluation as well as our dual focus on reducing uncertainty and coping with interpersonal racism, we were only able to develop three provotypes to represent the design themes from Chapter 5. Design themes that were important to our participants but did not directly align with our research questions (e.g., those that focus on systemic racism) were excluded. These themes should be explored in future work.

6.6 Summary

In this work I explore what it might look like to use technology aimed towards reducing uncertainty stemming from experiences with interpersonal racism through the design and evaluation of three provotypes centering on coping with interpersonal racism through uncertainty reduction and emotional validation.

Each provotype varied in how it addressed uncertainty. Counter to the expectations from both chapter 4 and 5, the design provotypes that most directly reduced uncertainty were the most poorly received by participants in our evaluation. Instead, introducing methods of uncertainty reduction revealed a new set of priorities and considerations that must be balanced in the design of coping technology: agency, privacy, and safety. Participants were often taken aback by the audacity of the provotypes that called out racism by name - more often concerned with the possible backlash aimed at them as the clearly positioned "victim" that the technology was calling out. Some participants had not even processed that something racist had happened and the introduction of racism may have been jarring when they were already vulnerable.

This may point to the limitations of addressing only one aspect of racism with technology in a world where technology has been repeatedly criticized for amplifying, embedding, and enacting racism and racial disparity (Ogbonnaya-Ogburu, 2020).

Chapter 7: Conclusion

This thesis work identifies contexts where uncertainty amplifies the negative impact of marginalization and presents designs that either directly aid in managing and reducing that uncertainty or help to reveal underlying assumptions and patterns in managing and reducing uncertainty. For me, this work is highly personal. In this concluding chapter of my thesis, I reflect on the relationship between uncertainty and marginalization and the role technology plays in mediating that relationship, first through a personal story and then through the specific findings of this thesis (7.1). I then summarize and reflect on how this thesis contributes to designing to empower in contexts of marginalization (7.2) as well as the methodological contributions for HCI researchers in designing and researching marginalization and social technology (7.3) and end by sharing thoughts on how this thesis contexts to a more national, public context (7.4).

7.1 Reflections on Uncertainty and Marginalization

The majority of this thesis work was motivated by my own experiences with interpersonal racism and sexism and my reflections on the ways I was both empowered and challenged in seeking support for those experiences. *[Content warning: racism, sexism, harassment]*

During my second year as a PhD student, I had arrived back at the Pittsburgh International Airport from NYC where I had just helped my college-aged sister move in for her freshman year. I boarded the extended parking shuttle as I had done countless times before to return to my car and start the 40 minute drive back to my home. I got in the shuttle and was the only one onboard and we left. I had earphones in but the driver started talking to me. Asking basic questions about where I went and what I was doing. I gave polite but short answers. I was exhausted and uninterested. After a pause he asked me "*what are you?*" This instantly infuriated me. I pointedly asked "*what do you mean?*" and he clarified that he wanted to know what race I was. I told him, "*I hate that question and I'm really tired of being asked that*." He did not take it as a sign to back off and instead began mansplaining to me why people care about it. Specifically he said, "*well I*

think most of the world, me included, are really attracted to Asian girls." My fury commingled with fear. I responded that I hate that and I hate the idea that people look at me and the first thing they want to do is deconstruct how I look. He ignored this and droned on about how he thinks Asian girls are really attractive even though he married a Mexican lady, she looks "*pretty Asian*" so it's close. He purposely drove past my stop three times before letting me off the shuttle. I hid between the cars and waited for it to leave before walking to my car. In the safety of my home an hour later, I reached out to my partner and my three younger sisters for support.

This experience was one of many impetuses for this thesis work. In those moments all I wanted to do was talk to the people I care about who would truly understand my experience. I wanted to feel that I wasn't alone and that my anger was justified. I also wanted to know what to do. I travel at least once a month through the airport, what if I encountered this driver again? What if he targeted another young woman of color? Speaking with other women of color, like my sisters, helped me process that experience. They made me feel seen and heard and helped me decide whether and how to take action. My group text with my sisters has enabled countless conversations about race and identity we had never had before we all lived in different states. From supporting each other with interpersonal racism, to unpacking and reconstructing how we each relate to our racial identity and our physical presentations of our race, to our shared culture that was only revealed once we started living and working with people away from home. Social technology has been an extremely powerful tool for me in processing the rage, grief, fear, and confusion that come with daily experiences of racism and oppression. At the same time, I had written four different drafts of a public statement on my experience. I desperately wanted to share what had happened to me for both catharsis and for the safety and wellbeing of others who might find themselves in similar situations. Ultimately I deleted each draft and never posted. At the time I was unable to articulate what held me back, besides a sinking feeling in my gut each time I went to publish the story. This work is my contribution in validating those experiences and asserting that we can unpack and begin dismantling the patterns that amplify vulnerability for those in marginalized and oppressed positions.

This work has uncovered the key role that uncertainty plays in the processing and longevity of experiences of marginalization. In the SCIPR project, I demonstrated ways of designing with uncertainty in order to motivate curiosity and engagement with the scientific process of hypothesis-testing and seeking answers. Over the course of that project, I discovered that determining the amount and type of uncertainty was critical to creating positive and motivating experiences, rather than overwhelming and threatening ones. In follow up work, we uncovered how children in amplified contexts of marginalization may pick up on unique forms of uncertainty that could contribute to a negative experience with game play and the playtesting process (Fath et al., 2018). This work presents many opportunities for HCI researchers in exploring other contexts where we might use games as a form of social technology for reducing and managing uncertainty.

In the CARE project, I identified the key role that uncertainty plays in the longevity of negative reactions to interpersonal racism as well as in motivating social support-seeking towards meaning-making. In this work I demonstrate ways of designing with and for uncertainty in a context where positive emotional outcomes are both unlikely and inappropriate, but where games and interactive fiction might still be used to study emotionally fraught and sensitive subject matter. This theoretical contribution enables HCI and games researchers and designers to design for uncertainty reduction as ways to counter oppression and move towards empowerment in our work on social platforms and technologies. This work is naturally amenable to extension, particularly on other forms of oppression. While beyond the scope of this thesis, the door is open for many fruitful trajectories in understanding how HCI research and design might address coping with and combating internalized, institutional, and ideological racism and oppression.

7.2 Designing for Uncertainty with Social Technology

This thesis presents theoretical and design artifact contributions to Human-Computer Interaction and Game Design.

On the theoretical front, this work demonstrates how uncertainty amplifies marginalization through emotional and cognitive overload. In designing for these experiences of marginalization, the SCIPR project demonstrates how we can design to alter the emotional reaction to uncertainty to decrease the impact of marginalization. The safe context of games is a powerful tool for engaging with the emotionally difficult aspects of racial marginalization. Games give us room for joy and for failure in ways that do not automatically reflect poorly on ourselves. In normalizing exploration, failure, and leveraging aesthetics, emotion, and narrative, we can deliver powerful experiences that can change our attitudes and behavior towards marginalizing experiences.

However, in some instances, attempting to impact the reaction of the individual can further marginalize and instead systemic change is needed. The CARE project demonstrates how we can consider the design of social technologies that empower individuals, while engaging with complex systems where individual and systemic marginalization cannot be separated. In designing for empowerment, we cannot ignore the role of systemic oppression. While these tools provide empowerment, technologists must incorporate a justice-oriented framework into the design and development of technology to avoid the simultaneous amplification of harm and to create more equitable partnerships with the populations we study and design for (Costanza-Chock, 2018). In the same way that video recording has empowered the voices of Black people in the fight for dignity, humanity, and to counter dominant narratives on police interactions, they have done substantial harm. As the May/June 2020 Black Lives Matter surge of protests have received less press coverage, we have seen police quietly surveilling protest videos to hunt down activists and arrest them and in response some city officials have begun considering and implementing bans on facial recognition technology. By using justice-oriented research frames such as prefigurative design (Asad, 2019), which encourages building counter-structures along with community partners, we can more quickly and ethically align our work with the expertise that BIPOC activists have long shared on the risks and benefits of social technology for empowerment.

7.3 HCI Research and Design Methods Considering Marginalization

This thesis presents methodological contributions for research and design for working with both children and adults in marginalized contexts.

In many instances across this thesis work, methodological innovation became necessary. Predominant methods for transformational game design, user-centered research and design, and participatory design often do not appropriately translate to working with participants who are asked to engage with vulnerable and/or marginalizing topics (e.g., identity-threat relevant topics such as STEM, experiences with interpersonal racism). This work produced methods for transformational game design with multidisciplinary teams, game co-design and playtesting for children with cognitive load depletion, and methods for using interactive narrative fiction for participatory design and remote, scalable user testing around technologies that engage with sensitive and vulnerable topics.

Specifically, this thesis embodies a perspective that games are an especially powerful and flexible tool. In this work I designed games as intervention for altering emotional relationships with the given subject matter, games as immersive first-person experiences to encourage perspective-taking and relation to fictional narrative, games as educational tools, games as research tools to develop theory, and games as a method of iterative design and user testing. Games and interactive narrative are powerful tools for engaging with sensitive and marginalizing topics in safe, immersive environments and work well within design methodologies meant to put agency and power in the hands of research participants. Much of the work in this thesis focuses on issues specific to race and racism with some discussion of how race intersects with other forms of identity. Extensions of this work might explore how to adapt these methods towards other aspects of identity and marginalization, such as ability, gender, sexuality, citizenship, etc.

The design methodologies in this thesis incorporate a design justice framework for co-designing both educational games and social technologies more broadly with both adults and children around vulnerable and marginalizing topics. While critical theory has been an important frame in

this work, I consider Sasha Costanza-Chock's recommendations for engaging in design justice practice:

> "*Design justice requires that we use a lens broad enough to capture structural inequality, which is not "solvable" in any traditional sense; at the same time, successful design justice projects must produce more than critique. Design produces things: objects, systems, interfaces, apps, illustrations, clothing, machines, buildings, and so on. This is the paradox of pragmatic design within a design justice framework: to develop workable designs and to generate products, designers must engage with the realities of limited resources. A radical, utopian design that won't be implemented because it requires resources that aren't available will not improve people's daily lives in the immediate future, whereas a limited, pragmatic design that is organized to meet available resources may be prototyped, revised, rolled out, and in the best case actually provide real benefits to real people.*" (Costanza-Chock, 2018, p. 219)

This work has produced design artifacts that empower uncertainty reduction at the individual level while putting those designs recurrently in conversation with the systemic factors that contribute to the marginalization that makes them necessary in the first place. Through interactive fiction this thesis indicates that we can push even further in playing out the consequences of our designs within fictional worlds towards both user testing and participatory speculative design methodologies. While we aim our aspirations towards structural change, we must also dedicate ourselves to working towards change every day in research and design.

7.4 Concluding Thoughts

This thesis has been completed during what will hopefully be viewed as a historic moment where conversations about systemic racism and oppression have been catapulted to both a nationwide stage in the United States as well as a worldwide stage as others across the globe stand in solidarity with the Black Lives Matter movement. During this time, my colleagues and I have been celebrated for having written and published what now appears to be a prescient paper for our academic community to have a lens into this ongoing movement, "*Critical Race Theory for*

HCI" (Ogbonnaya-Ogburu et al., 2020). We reject this claim of prescience and instead insist, as we do in the paper, that race and racism have been ever-present in our lives and in our work. This thesis represents years of labor pushed towards bringing conversations about race and marginalization in technology and human-computer interaction to the forefront. Though the intent of this thesis was to explore futures of empowerment through design (having presupposed prior knowledge in the community about racism and oppression), much of this thesis' contributions lay in simply revealing how BIPOC experience and cope with oppression in human-computer interaction and computer-supported cooperative work (CSCW) contexts.

An illustrative example of the precarious balance between oppression and empowerment are the ubiquity of video capture and streaming capabilities in phones. At present, these videos that reveal the extreme and pervasive use of police violence against Black people in America have forced a public acknowledgement of racist violence that has existed and been suppressed since the inception of this country. However, requiring visual validation of Black experiences of police violence has fed the dominant narrative that denies the existence of those experiences when they are not captured on camera. And they force BIPOC to relive and consume the brutalization of Black bodies. As Killer Mike said at a Mayoral press conference in May 2020, "*...I'm tired of seeing Black men die. He casually put his knee on a human being's neck for nine minutes as he died like a zebra in the clutch of a lion's jaw. And we watch it like murder porn over and over again.*" Participants in this thesis research expressed through their design proposals how violence and racism against them could only be validated and proven true to those in power through ubiquitous accounting of their lives. They knew this to be true and shared this many months before the murder of George Floyd in May 2020 sparked an international conversation and movement towards racial justice for Black lives.

Stemming from this thesis are multiple fruitful lines of inquiry in human-computer interaction anti-racist research and technology. At the same time, marginalization cannot be the only framework we use to engage with the experiences of BIPOC. Throughout this thesis in both the SCIPR and CARE projects, we saw themes surrounding the importance of BIPOC thriving (not just surviving) in a racist society. While this project aims to fill a gap in HCI literature by

speaking about the specific dynamics of racism and lack of focus on BIPOC users in social technology, we are encouraged not only to speak about deficits, but understudied areas of wealth in BIPOC use of social technology. Andre Brock Jr. writes:

> "*Focusing on racism as a frame for black identity, however, seems deterministic. After all, not every Black activity is subject to - or determined by - the racism Black folk experience through daily or systemic macro- or microaggressions. Nevertheless, given the structural inequalities that have been levied on Black folk and that are endemic to American culture, any research into Black online culture must address how technocultural racism has shaped Black digital practice.*" (Brock, 2020)

BIPOC play a central role in the construction of Internet communities, cultures, norms, and joy. In Critical Race Theory for HCI we argue that race should be a consideration in any research agenda. For those who may choose to center the BIPOC experience in their research agenda, I urge us to keep in balance the prioritization of fighting oppression with building the joyous, thriving, and justice-oriented futures we actually want to live in.

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