The Attuned Self Online: Designing for Connection

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A dissertation

submitted in partial fulfillment of the

requirements for the degree of

Doctor of Philosophy

University of Washington
2024

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Program Authorized to Offer Degree:
Computer Science and Engineering

University of Washington

Abstract

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Connection is of pivotal importance to human health and well-being, with relationship satisfaction outweighing factors such as genetics, IQ, and socioeconomic status. Staying connected in the digital age is difficult, as phone usage, social media, and messaging platforms all have the potential to disrupt connection. Technology, and particularly phone addiction and social media, have been criticized for how they can erode users' relationships.

In this dissertation, I describe how the design of digital social and communication platforms can help foster *attunement*: a sense of deep connection, including feeling seen, heard, and known. First, I describe how the current social media landscape falls short of user needs for connection, especially in the face of hard conversations with loved ones, as the result of interviews and a survey. I find that asynchronicity of text-based conversations leads users to feel that conversations are more thoughtful, however, many *wish* they could have hard discussions online more productively than currently feels possible. Next, I describe the evaluation of 12 user-generated design concepts as storyboards via online survey. I find that users are most excited about design interventions that *humanize* each other and replicate behavior they already do offline. Next, I describe the user-centered design and research process to create Daffodil Messenger. Daffodil Messenger introduces two novel design approaches to foster a sense of attunement between two loved ones in conflict: tone indicators and pausing, which were iterated on through design sketching, user feedback in interviews, and finally implemented and evaluated with two pilot participants. These participants

liked the organization and clarity these designs afforded them, and they wished that it was possible to use these interventions with their friends and partners. This process has resulted in a body of research that demonstrates how design can intervene in hard conversations to foster attunement between loved ones.

Finally, I describe how social media design can promote a sense of attunement to oneself by disrupting and reducing dissociation. I do this through the design, development, and evaluation of a mobile alternative to Twitter, called Chirp. I show that users do experience a sense of dissociation while scrolling on social media, and current designs may both induce and prolong this sense of dissociation. By definition, dissociation suspends self-reflection, which is needed to self-attune. I demonstrate how designs such as *custom lists* and *reading history labels* can decrease dissociation, and thus, likely increase self-attunement. Taken together, this body of work demonstrates that users have an unmet desire for deeper connection online, and user-centered design can meet these needs.

Acknowledgements

As I reflect on my journey to attain this PhD, I am filled with gratitude for the support I've received from mentors, colleagues, friends, family, and loved ones, with whom I've been able to grow in my own sense of attunement to them and within myself. It has been a great joy and privilege to spend the past several years exploring the known and unknown with you.

To Alexis Hiniker, for being so generous with your time and encouragement as I pursued a research area that was initially new to both of us. For helping me work through my own anxieties related to my work, for your kindness and understanding, and for your endless optimism. And for your expertise in human-centered design, research, and engineering that helped me get unstuck in many advising meetings. Thank you for helping me develop into the scholar and researcher I am today.

To my committee members, Amy Zhang, Tim Althoff, and Benjamin Mako Hill, thank you for your thoughtful feedback and support of my work, from feedback on specific papers and presentations to perspectives on the research process in general. I am deeply grateful for your time and energy and how it has shaped my research.

To my mentors outside of UW, thank you for introducing me to industry research, helping me navigate my career, and providing new opportunities: Xiao Ma, Ariel Liu, Jilin Chen, Michelle Chin, Joe Paxton, and Chris Chapman.

To all of the colleagues and UW community who have welcomed me into academia. I'm grateful to

have had your wisdom and friendship throughout the years. In particular, Thank you to Erin Wilson, Matt Johnson, Nicasia Beebe-Wang, Nathan Hatch, Kat Hoffman, Peter West, Chris Fu, Robert Wolfe, Larry Tian, Raveena Rao, Anastasia Schaadhardt, Katherine Cross, Julia Dunbar, Ishita Chordia, Stefania Druga, Romain Camilleri, Ashley Mochizuki, Wei Jun Tan, all of my office mates over the years, and those who attended and co-organized Diverse Genders in Computing Events. Being in community with you has been a gift.

To all of my friends who supported me on this journey: Katherine Hess, Rachel Weeks, Lauren Thein, Izzi Grasso, Lidia Morris, Anna Beers, Victoria Peterson, and Taylor Wilson. Thank you for hearing me through many much needed spiraling sessions. Your support, encouragement, and good humor through this has given me an embodied sense of what it means to be in attuned relationships.

To my parents for your steadfast support of me through the ups and downs of this process. Thank you for always emphasizing the value of education and opening doors for me to pursue the best education available to me. **To Mason** for introducing me to Dark Souls, so I could do something just as challenging as a PhD in my free time. **To my family** for your support, laughter, and good times throughout the years.

To so many more who have impacted me through this process. Working on a PhD in the midst of a global pandemic has taught me how much the smallest interactions matter, and how even the relationships that end contain important lessons. To the baristas who made the coffee that fueled my paper writing sessions, to the people I've been in conflict with, to my healthcare team who made this PhD possible for me: thank you for the lessons, the learning, the laughs, and the coffee.

DEDICATION

Because every word I carry is another stone to put into place in the foundation that I'm building

Because the days can erase something that I never saw

What all of us wanted and what none of us got

What we all had and have and what we all forgot

That we all wanted to be something

That we all became something

And it might not be the mess we once thought we'd be when we were kids, but something is still something

And like some cats say: something is better than nothing

Feet are smarter than an engine

And dreams are stronger than thighs

And questions are the only answers we need to know that we are alive as I am when I have the mind of a child

Asking, why is 2 + 3 always equal to 5?

Where do people go to when they die?

What made the beauty of the moon?

And the beauty of the sea?

Did that beauty make you?

Did that beauty make me?

Will that make me something?

Will I be something?

Am I something?

And the answer comes: I already am, I always was, and I still have time to be

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ANIS MOJGANI, *excerpt from* HERE AM I

Contents

Chapter 1

Introduction

Close relationships, more than money or fame, are what keep people happy throughout their lives... Those ties protect people from life's discontents, help to delay mental and physical decline, and are better predictors of long and happy lives than social class, IQ, or even genes.

Liz Mineo, Harvard Staff Writer

Relationships are one of the most important factors in long-term health outcomes, happiness, and satisfaction [Argyle, 2013; Holt-Lunstad et al., 2015; Mineo, 2017; Ware, 2012]. People have a strong intrinsic drive to form social bonds with others [Baumeister and Leary, 1995], and social isolation causes intense distress [Holt-Lunstad, 2017]. Close, supportive relationships are one of the most important contributors to happiness and subjective well-being [Saphire-Bernstein and Taylor, 2013], and investing in relationships helps to protect people from the negative impacts of adverse life circumstances [Beardslee and Podorefsky, 1988]. One of the most important factors for healthy relationships is a sense of *attunement*, or a sense of unbroken connection in which both parties feel felt, heard, and seen [Siegel, 2007; Erskine, 1998].

Digital communication has become ubiquitous in people's personal and professional lives, as people increasingly rely on social media and communication platforms to build and maintain relationships [Heimlich, 2011; Sidoti, 2019; Wormald, 2013; Parker et al., 2022]. However, all too often, technology disrupts, erodes, and otherwise harms people's ability to remain in attunement to themselves and each other. In this dissertation, I seek to understand how design can influence people towards greater attunement *with each other* during hard conversations online and *within themselves* while scrolling on social media.

I focus first on how to design for attunement with others during hard conversations online because research has shown that communication becomes especially important during conflict and in romantic couples; relationship quality is largely predicted by how they navigate conflict together [Joel et al., 2020]. Similarly, attachment theorists have found that negative events in relationships, such as conflict, have the most significant consequences for relationship well-being [Gottman et al., 1998; Finkel et al., 2017], and how conflict is resolved predicts relationship satisfaction and stability [Gottman and Levenson, 1999; Finkel et al., 2017]. Additionally, Gottman and Krokoff [1989] suggest that disagreement may positively affect relationship satisfaction long-term in married couples. Overall, navigating conflict well is an opportunity to bring relationships closer [McLaren and Steuber, 2013; Gottman, 2011].

Beyond attuning with others, another critical component of healthy functioning in relationships is the ability to *attune to oneself*. Much like attunement to others, this involves becoming aware of one's own emotions, desires, and needs [Erskine, 1998; Siegel, 2007] and establishing internal communication amongst conflicting thoughts and feelings [Lamagna, 2011]. Chronic dissociation can prevent self-attunement from occurring, which subsequently leads to loss in internal communication and functioning [Lamagna, 2011], and there is evidence to suggest that people experience dissociation while scrolling on social media [Olson et al., 2020; Tran et al., 2019].

Therefore, in this dissertation, I explore the following thesis statements:

Thesis Statements

1. While many features and affordances of social media and communication platforms currently do not meet people's needs for cultivating connection, or attunement, to themselves and others during hard conversations online, people still *wish* they could have these discussions online.

2. By drawing on psychology literature and user-centered design methods, we can design interventions with a high likelihood of supporting people during online conflict, and subsequently, increase attunement between people during hard conversations online.

3. People experience normative dissociation while using social media, which may be induced and prolonged by current design patterns. However, design can disrupt and prevent normative dissociation from occurring, increasing self-attunement.

To defend these thesis statements, I describe the design, implementation, and evaluation of two systems aimed at increasing connection to self and others online.

1.1 Approach

This thesis makes empirical and artifact contributions to the field of human-computer interaction and social computing. In Part I, I include an empirical analysis of how design influences people's experiences on current social media platforms, including how people *wish* for additional design support to attune to others during hard conversations online. The majority of Part I is focused on an increasingly specific body of work on how design impacts private messaging experiences in close interpersonal relationships during hard conversations online. This includes data supporting two novel design interventions: *tone tagging* and *pausing*. This is coupled with artifact contributions in the form of storyboards, interactive high-fidelity mockups, and finally, a messaging web app.

In Part II, I include an analysis of how people currently experience dissociation on social media platforms, and I make the argument that this prevents self-attunement from occurring. I demonstrate through the deployment of a custom Twitter app, called Chirp, that design can prevent and disrupt dissociation, which increases opportunities for self-attunement online. It is my hope that this work will culminate in tangible changes to design that allow people to communicate more intentionally with one another, to foster a sense of closeness and responsiveness that eases the maintenance and development of close interpersonal relationships.

Chapter 2

Common Theoretical Background

In the sections to follow, I describe the relationship between attunement, attachment theory, and conflict. Separately, I describe how dissociation can disrupt self-attunement, and its implications.

2.1 Overview of Attunement and Attachment Theory

In developmental psychology, attachment theory refers to the theory of development of attachment relationships between parents and children throughout the child's life [Bowlby, 1958; Ainsworth, 1962; Salter Ainsworth and Bell, 1981]. Attachment relationships strongly influence children's patterns of relating to others throughout their lives [Ainsworth, 1985], and predict outcomes such as successful social relationships, performance in school, and mental health outcomes [Young et al., 2019], with insecurely attached individuals generally experiencing worse outcomes [Young et al., 2019]. Of particular importance to developing secure attachments in early childhood is the concept of *attunement* [Siegel, 2007]. Interpersonal attunement is a process in which two people become aware of and respond to each other, with emphasis on feeling heard, seen, and understood [Siegel, 2007], and an experience of unbroken connectedness [Erskine, 1998]. It is closely related to *responsiveness*, which is one of the most important factors for long-term personal and relationship well-being [Finkel et al., 2017; Debrot et al., 2012; Gable et al., 2012], especially in negative situations. Responsiveness may be defined as the degree to which one is "*cognizant of, sensitive to, and behaviorally supportive of*" the core values and needs of another person [Finkel et al., 2017; Reis, 2007]. This goes beyond more general forms of support – responsiveness is unique to the needs of a rela-

tionship, individual, and context [Otto et al., 2015; Finkel et al., 2017]. This will be particularly relevant as we discuss online conflict in close interpersonal relationships.

Attunement to others in early development is thought to grow one's ability to attune to themselves (self-attunement), which aids the self in managing self-states [Lamagna, 2011]. Self-states refer to intrapsychic parts that hold their own emotional and motivational drivers. Intra-relational psychology proposes that the psyche comprises two frames of references: one that represents and experiences self-states' physical, emotional, mental, and behavioral impulses, and another that reflects on, organizes, and appraises responses to these experiences [Lamagna, 2011]. These two frames of reference form an internal attachment system. Much like interpersonal attachment styles, Lamagna [2011] says that "*the level of wellbeing that an individual is capable of achieving will be dependent upon the degree of harmonious interplay between parts of the self.*" This will be particularly relevant as we discuss dissociation and self-attunement online.

2.2 Conflict and Attunement

A necessary part of forming close social bonds with others is navigating conflict [Gottman et al., 2018], and navigating it well is an opportunity to bring relationships closer [McLaren and Steuber, 2013; Gottman, 2011]. In Gottman et al. [2018], they consider being in conflict synonymous with, to "*fight or discuss difficult and uncomfortable issues*." Communication scholars differentiate a disagreement, argument, and conflict [Wrench et al., 2020; Paglieri, 2015], stating that while differences of opinion (disagreements) can turn into arguments (verbal processing of the disagreement), they are only considered conflict once they become verbally aggressive. This dissertation spans disagreements, arguments, conflicts, and discussion of difficult emotional topics, which is most aligned with Gottman's implied definition of conflict.

I contextualize these conflicts as part of people's "bids for connection" in relationships [Gottman and DeClaire, 2001]. Bids for connection can be considered any attempt for attention in a relationship [Gottman and DeClaire, 2001]. People routinely make and respond to bids, and these micro-interactions are so important, they are considered the "*fundamental unit of emotional connection*" [Gottman and DeClaire, 2001]. Cumulatively, how people respond to bids from each other will determine the quality of their relationship [Gottman et al., 2008]. Bids for connection do not necessarily have to be related to a conflict, but they can be. For example, a bid for connection in conflict could look like bringing a concern directly to a partner,

or subtle, by hinting around the concern in an indirect way [Gottman and DeClaire, 2001].

Driver and Gottman [2004] propose that there are three potential responses to a bid for connection: *turning toward*, *turning against*, and *turning away*. When someone *turns toward* in conflict, this looks like responding positively and in emotional attunement with the person raising the concern. These responses demonstrate care towards the person making a bid and are specific to their unique needs and preferences. When someone *turns against* in conflict, they demonstrate negativity or rejection of the emotional state of the other person. This leads to emotional distance between people, as the bid-maker will withdraw [Navarra and Gottman, 2019], and over time, this will corrode a relationship [Gottman, 2014]. Finally, the worst of these options is to *turn away*, in which someone ignores the bid entirely. Consistently turning away from bids results in the dissolution of relationships and is a strong predictor of divorce in married couples [Gottman, 2014]. This demonstrates how critical it is that people equip themselves and their loved ones with the skills needed to navigate conflict effectively, by turning towards each other. I make the argument that design can help.

2.3 Design's Influence on Conflict and Attunement

People naturally incorporate computer-mediated communication into their conflicts as needed [Scissors and Gergle, 2013], and there are many examples in which research has shown that subtle variations in design can impact how people communicate with one another. Research has demonstrated how design has the power to influence people to be more thoughtful [Sukumaran et al., 2011] and authentic [Kelly et al., 2018; Liu et al., 2021] during online communication and show active listening skills [Kriplean et al., 2012b].

However, computer-mediated communication also comes along with its own set of potential pitfalls, as the lack of synchrony creates uncertainty around when a message will receive a response, and delays lead to user frustration [Hwang et al., 2019]. This may be reconceptualized as uncertainty around whether a bid (message) will be turned toward (responded to) or turned away from (not responded to). As such, many different interventions have explored how to create feelings of closeness during online communication. One example is PocketBot [Zheng et al., 2021], which introduced a "knock on the door" feature to help long distance couples initiate and come back to conflict. This feature helped by introducing the topic to both parties and asking them if they were open to discussing it, and then led them through prompts to help facilitate

the discussion. Another study by Costa et al. [2018] demonstrated that giving people voice feedback with a more calm tone helped them to feel less anxious during conflict. Past work has also demonstrated how qualities in communication aligned with attunement, such as responses tailored to the recipient's sense of self [Kelly et al., 2017] or mirroring each other [Stepanova et al., 2022], increase feelings of connectedness online.

Overall, interpersonal relationships have a profound influence on human experience [Argyle, 2013] and are shaped by the technologies people use. Yet, there is limited theoretically grounded work blending relationship science with design practice, and prior scholarship calls for new design approaches that leverage the rich, existing scientific literature on interpersonal relationships [Hassenzahl et al., 2012; Taylor and Bazarova, 2018]. This dissertation demonstrates 1) how current popular social and communication platforms do not meet people's needs for attuned communication during hard conversations online and 2) how design can influence people towards patterns of behavior that increase attunement during conflict.

2.4 Self-Attunement and Dissociation

Intra-relational perspectives on self-attunement state that, similarly to interpersonal attunement in which two people seek to understand each other's unique emotions and motivations, that there exists within humans a form of normative multiplicity, in which the self comprises unique self states that hold their own emotions and motivations [Lamagna, 2011]. Healthy functioning and organization of these self-states relies not on the strength of any one particular state, but rather of how the self balances and distributes stresses across the system [Sander, 2002; Lamagna, 2011; Siegel, 2007; Lamagna and Gleiser, 2007]. When the self-system can maintain reciprocal connection amongst the self-states, a general sense of well-being and responsible flexibility may be enjoyed, including greater capacity for complexity and coherence [Siegel, 2007; Lamagna, 2011].

Self-regulation is achieved by integrating these self-states into a state of wholeness [Lamagna, 2011; Sander, 2002]. Dissolution of intrapsychic wholeness, such as that experienced due to chronic *dissociation*, disrupts self-regulation and hinders one's ability to self-organize and take adaptive action to communicate amongst internal self-states [Lamagna, 2011; Bromberg, 2014]. When self-states no longer are in communication with each other, either by failing to register new information or actively rejecting information,

functioning suffers [Lamagna, 2011].

Many scholars believe that dissociation exists on a continuum from ordinary, everyday experiences to more distressing, trauma-based symptoms that define dissociative mental health disorders [Bernstein and Putnam, 1986; Butler, 2004; Hilgard, 1977; Ludwig, 1983]. Across the spectrum, all dissociative experiences share: (1) absorption, the focusing of the lens of attention to a narrow range of experience; and (2) diminished self-awareness, often accompanied by a reduced sense of time and control and a gap in one's memory [Butler, 2006]. As Krippner and Powers [1997] say,

> "*'Dissociative' is an English-language adjective that attempts to describe reported experiences and observed behaviors that seem to exist apart from, or appear to have been disconnected from, the mainstream, or flow of one's conscious awareness, behavioral repertoire, and/or self-identity. 'Dissociation' is a noun used to describe a person's involvement in these reported dissociative experiences or observed dissociative behaviors.*"

One common form of normative dissociation is "highway hypnosis," in which, on a long stretch of highway with few demands on conscious awareness, people can drive a car, respond to external events in an expected and safe way, and have no conscious recollection of doing so [Freyd et al., 1998].

Dissociation may be done spontaneously, in the form of passive dissociation such as daydreaming, or actively, in which one pursues an absorptive activity such as reading, watching a movie, or playing computer games [Butler, 2004; Butler and Palesh, 2004]. Butler and Palesh [2004] state that the pursuit of dissociative activities is so common and second-nature, "*that its role in our lives has not been fully appreciated or examined empirically.*" I propose that design influences users towards patterns of interaction online that induce and sustain normative dissociation, decreasing people's ability to self-attune.

2.5 Design's Influence on Dissociation and Self-Attunement

Prior literature hints at a connection between normative dissociation and social media use. For example, "The 30-Minute Ick Factor" describes a sense of disgust people report upon suddenly noticing they have spent a notable amount of time on social media when they only meant to check in briefly [Tran et al., 2019]. In prior work, users describe experiencing "Internet blackout" [Levy, 2016] and compare browsing social

media to entering a "trance" [Lyngs et al., 2020]. Similarly, Olson et al. [2020] found that smartphone addiction positively correlates with hypnotisability, and hypnosis is generally agreed to be a dissociative state [Butler et al., 1996; Butler, 2006; Hilgard, 1965; Kluft, 1984; Spiegel and Cardeña, 1991]. This suggests that normative dissociation may be related to people's experiences of technology overuse. The loss of awareness and control users describe and the internal question of "*what just happened?*" after browsing social media are all characteristic of normative dissociation.

Social media may be a particularly attractive avenue for dissociation, and the encompassed escape from the burden of volition, due to various aspects of its design that are intended to keep users "hooked" on the experience [Eyal, 2014]. Ritualistic gratifications are introduced by design through "variable rewards" which keep users "on the hunt" for new content [Eyal, 2014]. Oulasvirta et al. [2011] found that platforms that give users quick access to information rewards encourage a "checking habit," in which the user frequently and mindlessly checks back on the experience. This is explained by the fact that information can engage the brain's reward system similarly to anticipation of winning a lottery or eating food [Kobayashi and Hsu, 2019]. Variable rewards cycles are facilitated through common interface design patterns across social media platforms, including infinite scrolling [Purohit et al., 2020] and auto-play [Lukoff et al., 2021].

The abundance of design features which encourage a "checking habit" [Oulasvirta et al., 2011] and ritualistic gratification [Eyal, 2014; Kobayashi and Hsu, 2019; Hiniker et al., 2016] have led many researchers to debate whether social media use is addictive [Tran et al., 2019]. Some studies have found that weaker impulse control predicts heavier smartphone use, which supports the addiction hypothesis [Şahin Gökçearslan et al., 2016; Wilmer and Chein, 2016]. However, other work argues everyday leisure activities like social media use should not be considered "addictions" unless they also lead to distress and functional impairment [Kardefelt-Winther et al., 2017; Przybylski et al., 2017], and the narrative of technology addiction needs to be carefully examined within scholarly communities [Lanette et al., 2018]. Across the board however, it is generally agreed that social media design does encourage compulsive use [Eyal, 2014; Oulasvirta et al., 2011; Kobayashi and Hsu, 2019; Purohit et al., 2020; Lukoff et al., 2018], and many users are not satisfied with ritualistic usage patterns [Lukoff et al., 2018, 2021; Tran et al., 2019]. I propose that design can influence people towards or away from normative dissociation, and as a result, affect their ability to self-attune, which explains why so many people have unsatisfying relationships with social media.

Part I

Attunement To Others

Chapter 3

Hunger for Hard Conversations Online and The Impact of Design

Good faith disagreements and healthy conflict management are essential to building strong relationships. People increasingly use computer-mediated communication during disagreements, which raises the question of how technology and design impact users' disagreements and relationships. I, along with my colleagues [Baughan et al., 2021], investigated users' experiences arguing with strangers, friends, and loved ones across common social and communication platforms, investigating how cross-cutting designs and platform-specific features relate to the tenor of hard conversations online. Specifically, we asked: Given the many forms of technology-mediated communication people engage in, which features and affordances do users perceive as most relevant to their arguments online? To answer this question, we conducted a two-part, mixed-methods study. We first conducted semi-structured interviews with 22 people, asking about their experiences arguing on social media platforms. We then administered a survey to 137 participants to examine and quantify interview themes across a broader sample.

This chapter contributes an overview of the features and affordances of ten popular social platforms that are relevant to users in the context of online arguments, along with their goals for disagreements online. We find that people have a desire to discuss challenging topics on social media they currently use, but they often hold back due to fear of an argument. Many participants said that current platforms did not support healthy conflict, however, there were aspects of particularly messaging platforms that were beneficial. Participants

highly valued privacy of messaging platforms, and they believed that the asynchronicity of online communication facilitated greater thoughtfulness than offline communication. This demonstrates that designing to support hard conversations online is both a valued and challenging endeavor, and novel designs to support hard conversations online may facilitate greater attunement.

3.1 Background and Motivation

An enormous amount of communication now occurs online, as the number of people on social media platforms is higher than ever [Sidoti, 2019]. Unsurprisingly, online disagreements are common; more than 20% of people say that, at times, they find themselves embroiled in conflict online [Group, 2017]. Many people try to avoid online arguments because of their tendency to turn toxic [Grevet et al., 2014; Powers et al., 2019] and damage relationships [Sibona, 2014; Wang et al., 2011]. However, conflicts serve an important role in close interpersonal relationships, as they allow people to consider their needs and create meaningful changes [TEDx, 2016]. Prior work has shown that when people argue, they often want to leverage digital platforms [Madianou and Miller, 2013], and it is possible, but rare, to argue productively online [Tan et al., 2016]. This suggests that it is a worthwhile endeavor to design platforms that support engaging in constructive disagreements, rather than avoiding disagreement altogether.

A number of studies demonstrate systematic differences between online and offline conversations [Hinduja and Patchin, 2008; Lapidot-Lefler and Barak, 2012; Lipinski-Harten and Tafarodi, 2013; Suler, 2004; Wu et al., 2017]. Nuances of body language and tone–only present during real-time, face-to-face (or voice-to-voice) communication–convey vast amounts of information to conversational partners [Mehrabian et al., 1971]. Without this information, users find less common ground with others [Lipinski-Harten and Tafarodi, 2013] and become more uninhibited [Suler, 2004; Wu et al., 2017], making them more likely to instigate heated debates but no more likely to resolve them. At its worst, online disinhibition allows toxic behaviors to flourish, which can include incivility [Borah, 2014], harassment [Blackwell et al., 2017; Citron, 2014; Jhaver et al., 2019], trolling [Cheng et al., 2017], and cyberbullying [Kwak et al., 2015; Hinduja and Patchin, 2008]. Specific design affordances such as invisibility, perceived anonymity [Suler, 2004; Wu et al., 2017], and lack of eye-contact [Lapidot-Lefler and Barak, 2012] contribute to toxic disinhibition and decreased empathy online. Although some work has found that certain users are more prone to incivility online than others [Maity

et al., 2018], other work has found that "anyone can become a troll" [Cheng et al., 2017].

The impacts of toxic online disinhibition can be long-lasting and affect both online and offline relationships. Disagreeing with someone's posted content is a common motivation for unfriending on Facebook [John and Dvir-Gvirsman, 2015; Semaan et al., 2015; Sibona, 2014] and users often regret posting angry content because of the damage done to self-presentation and relationships [Wang et al., 2011]. Online posts can also lead to more severe consequences such as job loss or the dissolution of romantic relationships [Wang et al., 2011]. However, not all online arguments end in lasting damage. Sometimes, users report maintaining connections that they have considered severing because they value the relationship [Krämer et al., 2015]. They also sometimes consider an inflammatory online post to be a minor issue in a strong friendship, with weak ties being the most vulnerable to long-lasting repercussions [Grevet et al., 2014]. Online disinhibition can also manifest as *benign disinhibition*, in which people offer more kindness and generosity to others online than they do in person [Suler, 2004]. This suggests that there is room for designers to capitalize on benign disinhibition and nudge users toward patterns of dialogue that enable them to remain open-minded in the face of online conflict.

3.1.1 Differences in Online Arguments across Different Popular Platforms

Research has found that arguments on Facebook [Grevet et al., 2014], Twitter [Yardi and Boyd, 2010], and Reddit [Jhaver et al., 2017], often create strain in relationships and do not result in changed opinions. For instance, Liu and Weber [2014] found that Twitter is limited in its ability to foster effective, democratic discourse, and the effect of Twitter arguments is typically to reinforce pre-existing views [Yardi and Boyd, 2010]. Users also consider tweets to lack the contextual depth necessary for engaging in constructive dialogue [Semaan et al., 2015]. Facebook is considered a difficult place to maintain friendships with those who have different opinions, especially during heated political debates [Grevet et al., 2014]. However, when users have an explicit goal of sharing and considering opposing viewpoints, as found in the subreddit ChangeMyView, they often find engaging in the arguments to be a positive and constructive experience. Still, in the majority of instances, users do not change their view [Jhaver et al., 2017; Tan et al., 2016]. This highlights the important role of people's attitudes when arguing online. Those who are open to or actively seek out diverse opinions are more likely to engage respectfully and less likely to experience

polarization [Semaan et al., 2014]. Liao and Fu [2013] found that the tone of an argument affects participants' likelihood of changing their views, and people are less likely to engage with content that contradicts their views if they perceive the interaction to be threatening. Additionally, polite disagreements on ChangeMyView seemed to be most successful [Jhaver et al., 2017]. Thus polite and respectful conversational tone may promote engagement on controversial topics.

These studies provide evidence for how online arguments can still be a positive experience, even when no one changes their opinion, which leads us to emphasize the *process* not the outcome, in arguing well. It also shows how users have different experiences in different online spaces. People sometimes channel switch across social media platforms to tailor their platform to their intended audience and content [Zhao et al., 2016] and to have greater freedom of self-expression [Griggio et al., 2019]. Hence, it is important to holistically evaluate all social media people use in the context of online arguments when evaluating the impact of design on online conflict. In this chapter, I demonstrate through interviews and survey how current social media design leaves users unsupported during online conflict, and users wish to have more difficult conversations online.

3.2 Methods

Here I outline the interviews and survey that comprised my investigation into how current social media and communication platforms affect people's hard conversations online.

3.2.1 Interviews

Participants

Colleagues and I recruited 22 adults to participate in a two-part interview study. Participants were a convenience sample recruited through snowball sampling and posts on email lists and social media. The plurality of interviewees were college students ($n = 12$). 68% of participants ($n = 15$) provided their age, gender, and race as part of a free-response form, of which four were women, ten were men, and one was non-binary. One of the men was trans; no other participants reported being trans or cisgender. The average age was 22.4 ($sd = 4.8$). The plurality of participants self-identified as Asian or Asian American ($n = 12$). During

recruiting, the research team explained that we were studying online arguments, and that participants were only eligible if they had argued with someone online at least once in the past. Interviews lasted approximately 30-45 minutes, and each participant received a US $20 gift certificate to Amazon.

Materials and Procedures

The interview was conducted in two parts. First, we asked participants to name all of the social media and messaging apps and websites they use at least once a week. We repeated the same series of questions about their experiences with arguments for each of these platforms, asking things like, "*Do you feel like you can talk about challenging topics with other people when you're using [platform]?*" We then asked if the participant could recall a specific argument in which they had engaged on the platform of interest, and if so, to describe the details of this event. We separately asked participants to participate in a sketching activity, which we discuss in more detail in the Chapter 4.

Analysis

Interviews were transcribed in their entirety, anonymized, and analyzed via an inductive process [Creswell and Poth, 2016]. Six members of the research team read independent subsets of interview transcripts to identify emergent themes through open coding. The team met weekly for one month to iteratively discuss and refine these themes and compare examples from different participants. Each team member then selected a small number of themes to investigate more thoroughly, and over the course of one month, read all interview transcripts to identify instances of the selected themes. These quotes were used to collaboratively create an affinity diagram using Miro. The team then examined and refined each cluster as a group. One researcher then selected and organized key quotes based on the affinity diagram, and an additional two researchers who had not participated in the initial analysis reviewed these quotes to diversify perspectives and broaden and strengthen codes.

3.2.2 Survey

To quantitatively investigate the themes that surfaced in interviews across a broader user base, we conducted a survey with an additional 137 participants who self-reported engaging at least once per week with at least

one of the ten social or communication platforms that surfaced repeatedly in interviews. These platforms are listed in Table 3.1.

Participants

The 137 survey participants ranged from 18 to 64 years old (M=33.9, SD=9.8). All participants reported in a free-response gender prompt that they self-identify as men (n=82) or women ($n = 55$). Six unique racial groups were represented, the majority of which were White (n=88) and Asian or Pacific Islander (n=25). The rest (n=24) of the participants identified as Black, Hispanic/Latino, Native American/Alaska Native, or a combination of races and ethnicities. Participants' education ranged from high school degree or equivalent (n=20) to higher education such as a master's, doctorate, or professional degree (n=16), with the plurality of participants having achieved a bachelor's degree (n=64). Participants' political leanings ranged from extremely conservative (n=4) to extremely liberal (n=17), with the plurality self-identifying as moderate (n=30). Most participants' annual income was in the range of US $25,000-50,000 ($n$=50).

Materials and Procedures

We deployed the survey online on Amazon's Mechanical Turk platform. The survey was composed of several subsections:

- *General Usage*. Participants first reported which social media and messaging platforms they use on a weekly basis. For each of these platforms, participants were then asked how many hours per week they spend using it and whether they could remember having had an argument on that platform with someone they knew personally.

	Text-forward	**Image-forward**
Public	Facebook Twitter Reddit	YouTube Tumblr Instagram
Private	WhatsApp Messenger (Facebook) WeChat	Snapchat

Table 3.1: Social media platforms categorized by participants' perceptions. Participants compared and contrasted perceived public/private and text/image-forward platforms in interviews without prompting.

- *Specific Argument Instance*. Participants were then asked to describe the most recent argument they could recall having online, including: 1) the platform where the argument occurred, 2) what the argument was about, and 3) who they argued with.

- *Per Platform Experiences*. For each platform the participant reported using at least once per week, we asked participants a series of Likert-style questions probing whether they argue on the platform often and whether they feel they can discuss challenging or controversial topics. We also asked open-ended questions about their experience using the platform.

- *Demographics*. The survey concluded with basic demographic questions.

Participants were compensated US$3 for completing the survey, which took 16 minutes on average.

Analysis

We extracted two datasets from participants' survey responses. We used participants' descriptions of the most recent argument they had online to generate a set of 137 unique arguments, one per participant. We coded these arguments for the platform where they occurred, which was listed explicitly by participants in 133 cases. We also generated a long-form dataset with one entry for each platform that the participant said they used at least once per week, leading to a variable number of data points per participant, and a total of 579 total entries. Each entry included the platform, the participant, and the participant's responses to questions about that platform. As shown in Table 3.1, platforms were categorized according to themes that emerged during interviews, specifically, the differences participants described in their experiences on social media as a function of 1) audience, and 2) the perceived salience of text and images. Two researchers conducted inductive analysis and affinity diagramming on open responses to the prompt "*features that make arguing on [platform] easier/harder*." We ran a series of statistical analyses which were guided by the themes generated in interviews, as the purpose of the survey was to triangulate interview findings with a more diverse population.

3.3 Results: Impact of Design on Online Arguments

In interviews and survey responses, participants explained that the design of an online space can support having challenging conversations constructively and in ways that could not occur face-to-face, especially when initiating conversations. However, they simultaneously described other common properties of online spaces that interfere with the delicate process of working through a challenging topic and strip away important cues that occur in face-to-face contexts. Here, we describe these design tensions. Quotes have been lightly edited for readability and are denoted with (P) for interviews and (S) for surveys.

3.3.1 Hunger for Hard Conversations

Many participants told us that they "*try to avoid*" (P4) online arguments and "*try to stay somewhat hidden*" (P1) in social spaces online. Many perceived online arguments to be futile, and they favored talking in person or avoiding difficult topics altogether. P2 lamented that, "*it's hard to open a conversation where you're almost not allowed to have a conversation... it's just too much energy.*" However, despite the fact that participants described working to avoid controversial subjects, they also explained that they *wished* they could discuss these topics in online spaces. As P12 explained, "*I wish I could... talk to more people about my political stance, especially [with] family. But I feel like if I were to do that, it would lead to arguments.*" Similarly, P22 described a desire for more, "*nuanced conversations on identity*," saying that, "*there are sometimes where I do want to engage in that kind of conversation; sort of like academic almost conversation.*" However the participant further explained that they do not discuss identity online because, "*it just turns into, 'You don't agree with me. You're terrible. Blocked.' So, yeah, it's pretty unproductive.*"

Participants also stated that they want to work through difficult conversations more often, because they provide important growth opportunities. P9 explained, "*I pushed myself to talk about it, and it makes me learn more about relationships. It's really important to me and to my relationship with my friends.*" Across all interviewees, 68% (n=15) said they regularly use at least one app or platform where they want to discuss topics that they currently avoid, suggesting a hunger for conversations. Politics was the most frequently cited topic that participants said they want to discuss but avoid, along with ethics, religion, race, identity, and personal details about their life. This suggests that designs to support these conversations would be valued.

3.3.2 Asynchronicity Facilitates Thoughtfulness

Many participants described the time dilation (asynchronicity) of online conversations as a mechanism for encouraging constructive dialogue. For example, P6 explained:

> "*Online I have more time, so I can think out my responses. So I can actually have a full-blown argument that lasts longer than a couple minutes. . . And the person I'm arguing with will have time to come up with what to say.*"

Others concurred, saying that online, "*it's easier to step back and take a minute to think. In real life you can't do that. There's a lot more emotional charge*" (P18). However, participants also said that asynchronicity can make communication harder, because, "*sometimes it may be a while before the other person sees the message*," (S63) and, "*you may write something controversial and nobody will reply to it*" (S135). The latter was particularly salient for YouTube and Instagram comments.

Conversely, some participants thought messaging apps such as Messenger and WhatsApp could facilitate real-time conversations. "*The conversations happen in real time. It is like a real conversation or exchanging text messages. Given that, you can have a healthy back and forth with another person*" (S80). However, they also said that, "*instant messaging makes for less in depth arguments*" (S30). This feedback on time dilation points to seemingly conflicting desires for conversations to feel natural and as though they occur in real-time, while also affording more careful consideration of wording than in-person conversations.

3.3.3 Privacy and Channel Switching Facilitate Authenticity

Participants described self-censoring to project a certain image of themselves on social media, consistent with prior work examining how people cultivate their online persona [Bareket-Bojmel et al., 2016]. Participants explained that they are more authentic when using private or audience-restricted platforms, making it easier to bring up or respond to controversial topics.

> "*[On a] Twitter or Facebook newsfeed, you don't tend to be honest because other people are looking at you, and sometimes you don't admit your failures because other people are looking at your stuff. So to be honest and then have a honest conversation, I think it's better to have something that's private.*" (P1)

Thus, participants explained that as the audience for their communication shrinks, the likelihood of achieving shared understanding increases. As a result, users seek out platforms that provide more privacy when they want to discuss something challenging, and they refrain from responding to controversial content when they are aware of having an audience. Other participants contrasted experiences with larger and smaller audiences, saying things like, "*I can talk about it [sensitive topics] on Messenger, but I don't want to comment on it and all the people see [on Facebook].*" (P9).

Additionally, participants said that features of messaging apps such as "*seeing the online status of your friends*," (S124) being able to "*tell when they have read your message*," (S98), "*using emojis to show my facial expression*"(S100), and "*voice recording features*" (S38) made it easier to talk about challenging topics. The ease of switching channels also helped facilitate difficult conversations, as "*there is no special features to follow to be on Facebook Messenger [from Facebook]*" (S40), and "*Messenger can be accessed on your phone without having to login to your Facebook account*" (S29).

However, even with the increased affordances and privacy of messaging platforms, participants felt that they could not replace face-to-face conversation in some instances, and they preferred to meet offline to resolve arguments that began online.

> "*What I have realized about using Internet to talk about some stuff is, usually you talk about it and then it doesn't resolve right away, then my friends are like, 'Well, let's talk about it in person. It's not going anywhere.'... When you talk about it in person, you can express your emotion[s] better, and they don't read your emotion[s] wrong because you don't show your facial expression and stuff like that. So they talk about some stuff offline even though we started from KakaoTalk first*" (P1).

Participants carefully select which platform to have a difficult conversation on, and they are open to channel switching to incorporate the affordances they most highly value during an argument (see Fig. 3.1 for an overview of where arguments occur). Their desire to channel switch also shows that the affordances which help when initiating an argument may not help as time progresses.

Quantifying Experiences in Public and Private Online Spaces We used our survey to quantify participants' experiences arguing in public and private spaces. Using linear mixed models with participant ID and

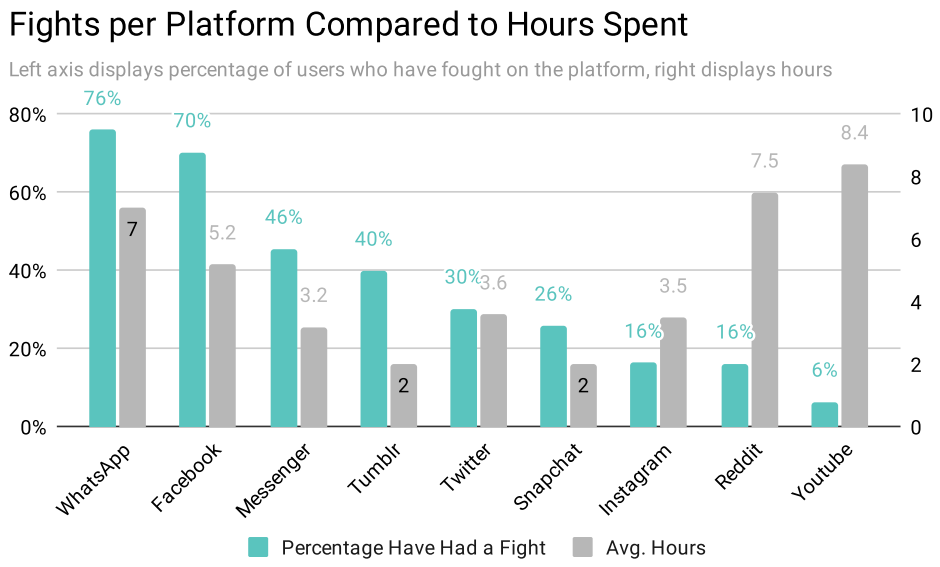


Figure 3.1: Number of participants who have reported arguing on various social media platforms, compared to average hours spent per platform.

whether the platform was public or private as predictors, we analyzed agreement on a Likert scale from 1 (strongly disagree) to 5 (strongly agree) with the four statements in Table 3.2.

We found that participants were significantly more likely to agree with the statement, *There are things that I wish I could talk about on [platform] but don't because it might lead to an argument*, on public platforms ($M = 3.00$) compared to private platforms ($M = 2.72$). Participants were more likely to agree with the statement, "*I feel like I can talk about challenging or controversial topics on [platform]*," private platforms ($M = 3.54$), rather than public platforms ($M = 3.12$). Thus, despite the fact that participants report becoming embroiled in arguments on both public and private platforms, they describe being more open and authentic in private spaces and more avoidant in public ones.

3.3.4 Image-Forward Platforms Have Fewer Arguments

Participants consistently reported that image-forward platforms such as Instagram, Snapchat, and Youtube led to fewer arguments than text-forward platforms. Participants explained, "*my Instagram conversations are more lighthearted"* (P10) because the purpose of interactions on the platform is to, "*send [other users] pictures"* (P10). Similarly, participants said, "*with Instagram, it's heavily photo-driven, so... it's not as easy*

Question	**Public** Mean (sd)	**Private** Mean (sd)	β	F(df)	p	Cohen's d
When I use [platform] I often find myself arguing with someone	2.19 (1.07)	2.21 (1.16)	-0.019	$F(1, 538) = 0.20$	0.65	0.02
I don't mind arguing with people on [platform]	2.73 (1.25)	2.84 (1.21)	0.036	$F(1, 533) = 0.65$	0.42	0.09
There are things that I wish I could talk about on [platform] but don't because it might lead to an argument	**3.00 (1.24)**	**2.72 (1.26)**	**-0.18**	$\boldsymbol{F(1,550) = 11.60}$	**<0.001**	**0.20**
I feel like I can talk about challenging or controversial topics on [platform]	**3.12 (1.28)**	**3.54 (1.20)**	**0.17**	$\boldsymbol{F(1, 542) = 12.11}$	**<.001**	**0.33**

Table 3.2: Statistical analyses on survey responses regarding public and private social media platforms. Mean, standard deviation, and Cohen's d are captured from t-tests, β values are from the linear mixed model, and F and p values are from an ANOVA on the linear mixed model.

to get into an argument" (P16).

However, other participants believed that incorporating video and photo content could help to facilitate difficult conversations online. YouTube videos were highly regarded for narrowing the scope of the argument: "*I like the fact that one particular video can be focused on, without having to defend a whole issue*" (S48). YouTube videos also facilitated social cues since you can "*see the person's facial expressions on the videos they produce*" (S56). The length of content was also considered beneficial, as "*you can make long videos to really explain yourself*" (S119).

Participants specifically mentioned how the visibility of people's comments and text posts affected the frequency of arguments:

> "*With Instagram, it's more like the picture, the person's caption... and a lot of people don't take the time to click on [the comments] and scroll through. Whereas, if you're scrolling through Twitter, you just see it right there, and then you're like, 'Oh I don't agree with that,' and then people start arguing with each other... Twitter is designed more for arguments, just because when you see the first tweet that someone tweeted... that can spark an argument because it's right there, they don't have to click on like comments and see what someone else said.*" (P17)

Survey participants corroborated interviewees' reports of having fewer arguments on image-forward platforms. Across all participants, 7% said their last fight occurred on an image-forward platform and 93%

said their last fight occurred on a text-forward platform, per categorization in Table 3.1. Participants consistently described the visibility of comments and conversation from other users as a feature that contributes to whether they view the platform as a place for arguments. Thus, manipulating the visibility of comments and conversations is likely an effective mechanism for foregrounding or foreclosing the possibility of discussing controversial topics.

3.3.5 Post and Comment Organization Facilitates Conversational Flow

Survey participants reported that the organization of a comments section can either help facilitate or hinder having difficult conversations online. For instance, Messenger, WeChat, and WhatsApp allow for "*one on one conversations, [which] keeps the focus on the discussion at hand*" (S60). This is in direct contrast to public social media such as Twitter, in which "*it's easy to get lost in the noise*" (S111) and "*it's hard to keep track of many conversations*" (S106). Participant's often blamed this on the interface and organization of such platforms. "*Reddit's reputation system makes it so that only the most popular topics are visible while controversial topics are quashed or simply not shown at all*" (S23). Regarding Facebook, "*One might be in the last chain of replies of a single comment, so it gets truncated automatically*" (S19). Or simply, in Twitter's case, "*scrolling through a conversation feed can be annoying*" (S112). YouTube and Instagram received similar criticism on the lack of organization for discussion. "*Because of the way [YouTube] is set up, it feels more like leaving a review than having a conversation*," (S94) and "*if you really want to discuss a topic and not just leave your opinion, the lack of interaction is an issue [on YouTube]*" (S17). Put simply, users "*just post and never respond [on Instagram]*" (S18). Thus, when a platform's focus is video and photo content, some users' desires to discuss content are hindered by the lack of interaction in the comments.

3.4 Discussion

The majority of our participants said that they regularly use platforms where they want to discuss topics they currently avoid—ranging from politics to details about their personal life. They expressed the belief that working through disagreements can ultimately strengthen their ties and, as a result, said they want to engage in these hard discussions. And yet, many described avoiding any conversation with even a hint of controversy.

Designing to support constructive arguments is both a difficult and worthy design problem, as shown by participants' unmet desire to have hard conversations online and their frustration with current platforms. They surfaced the benefits of having hard conversations online: asynchronicity allowed for thoughtfulness, message threads allowed for conversations to remain organized, and private messaging kept personal details in a safe space. Further, for our participants, the relationship often greatly outweighs the argument in its importance. Their choice to avoid arguments with friends and family online is often a sacrifice they make to protect their relationships with the people they love.

Numerous studies document the outsized influence interpersonal relationships have on long-term well-being [Hartling, 2008; Holt-Lunstad et al., 2010], concluding that close relationships are perhaps "*the greatest single cause*" of happiness [Argyle, 2013]. Participants' dissatisfaction with the status quo suggests that the design of the platforms they currently use, and the interventions we proposed, do not sufficiently prioritize their relationships. Designers have an opportunity to better account for this central part of life by foregrounding interpersonal relationships during the design process and drawing on evidence-based techniques for supporting healthy engagement in interpersonal interactions.

In particular, this work draws into contrast the framing of previous work that evaluates online disagreements based on their outcome: whether or not someone's opinion is changed [Jhaver et al., 2017; Tan et al., 2016]. Instead, rather than winning an argument, our work suggests that it is the *process* through which people engage in difficult discussions that must be improved. This insight solidified that increasing attunement during the course of hard conversations is a worthwhile endeavor, which we expand upon in the next chapter.

3.5 Conclusion

This work contributes a mixed-methods investigation of users' experiences discussing difficult topics across popular online platforms. We show that there is an unmet desire to discuss challenging topics in online spaces, and how various affordances of popular platforms help and hinder such discussions. We find that while participants *want* to have hard conversations online, they often feel as though they can not talk about difficult but important topics. Users liked how certain design features and affordances, such as asynchronicity and private messaging, created a more thoughtful environment that was conducive to discussing some-

thing difficult. However, the lack of interactive features in comments sections on platforms such as Instagram and YouTube made it more difficult to have difficult conversations effectively. This feedback from participants affirms TS1, that social media and communication platforms currently do not meet people's needs for cultivating attunement to themselves and others during online conflict.

Chapter 4

Novel Designs to Increase Attunement

In the previous chapter, we learned that users prefer to have difficult conversations on private messaging platforms, and they believe the asychronicity of such interactions facilitates a high degree of thoughtfulness. However, they still often felt that they *wished* they could have difficult conversations, but held back due to fear of starting an argument. This led us to conduct a multipart user-centered design and research process to create a messaging platform. To begin, we evaluated the sketches from the interviews in Chapter 3. We then distilled these sketches into 12 design approaches, and created one representative storyboard per idea. We then evaluated these storyboards with 98 additional participants.

We found that users value interventions that empower them and their communities to take action to shape their online spaces, as well as interventions that remind them of the humanity of others online. Across the storyboard evaluations, we found that users are excited about the potential for technology to support their relationships, but there are also many ways in which design can make a difficult situation worse. Users are categorically opposed to design interventions which they perceive to be too intrusive and heavy-handed, or those that would dilute the intent of their communication.

4.1 Background and Motivation

A number of studies illustrate how interface design plays a differential role in online discourse. People examine the environment around them for signals to help determine appropriate behavior, such as speaking more quietly as a consequence of being in a library [Aarts and Dijksterhuis, 2003]. This kind of norma-

tive influence on social behaviors also occurs online [Sukumaran et al., 2011] and can affect behaviors for better [Sukumaran et al., 2011] or worse [Cheng et al., 2017]. Sukumaran et al. [2011] found that certain online environmental cues, such as language and design, can affect the amount of thoughtfulness people perceive in others' statements and the amount of thoughtfulness they exhibit in their own communication. Website design creates an almost instantaneous affective response [Lindgaard et al., 2006], which highlights the value of designing for constructive conversation. Thus, although online environments can strip away important non-verbal cues, design choices can compensate for some of that deficit and systematically influence the extent to which users engage in prosocial communication patterns online.

Given the evidence that design can prompt behavioral changes [Sukumaran et al., 2011], a number of prior works have invented and evaluated novel designs to improve discourse. A series of work by Kriplean et. al. has illustrated the benefits of visualizing others' opinions in a nuanced way [Kriplean et al., 2012a] and of engaging in active "listening" by repeating, clarifying, and voting on interpretations of people's posts [Kriplean et al., 2012c]. Participants reported that discourse on these platforms was more productive than in other online spaces they occupy [Kriplean et al., 2012a,c]. These studies show that designers can systematically influence the way in which users engage in conversation and respond to conflict. Our work leverages these findings and extends them by examining existing design patterns that influence arguments and novel design approaches that could be applied across contexts to promote more constructive arguments online.

4.2 Methods

4.2.1 Interviews

The interviews that I describe here are identical to those in Chapter 3. However, here I describe a unique slice of interviews that were conducted and analyzed. The participants section is omitted here since it is identical to the previous section.

Materials and Procedures

The interview was conducted in two parts. The first part was reviewed in Chapter 3. In the second part, participants took part in a sketching exercise in which they were asked to invent three different ways that, "*apps or websites might help people have more constructive conversations online.*" The participant then walked the researcher through each of the design ideas, and the researcher asked follow-up questions to encourage the participant to elaborate as needed.

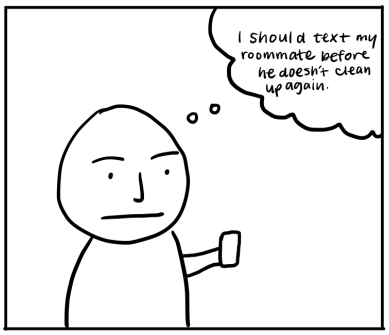
4.2.2 Storyboard Evaluation

Materials and Procedures

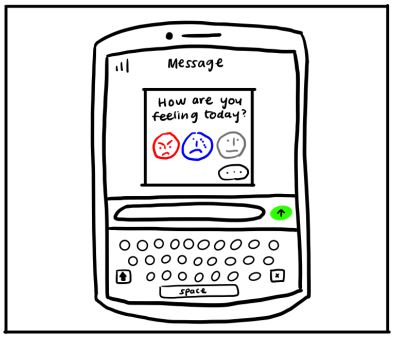
From the interviews' design sketching portion, the research team constructed a dataset composed of all participants' design ideas. These were then printed on physical cards, with one design concept per card, and the research team clustered the design ideas into a physical affinity diagram. Six members of the research team thematically analyzed these design ideas and met several times to iteratively discuss and refine these emergent themes. A final set of 12 themes were chosen, and each of the six members was assigned two themes and independently developed storyboards for those themes. Many of these 12 storyboards encompassed multiple unique design interventions within the theme. Final storyboards were decided by consensus through discussing and combining ideas within each design approach. An example storyboard is shown in Figure A.12.

We embedded all 12 storyboards in a new survey, which we deployed on Amazon's Mechanical Turk. We asked participants how often they used social media and messaging apps, and which specific platforms they used. We then presented each of the 12 storyboards sequentially and in random order. For each storyboard, participants responded to two scaled-response questions asking them to assess their reaction to the concept and how willing they were to try it, from "Very Negative/Unwilling to Try" to "Very Positive/Willing to Try." There was also a required open-ended question asking what they liked and disliked about each storyboard. The survey concluded with demographic questions.

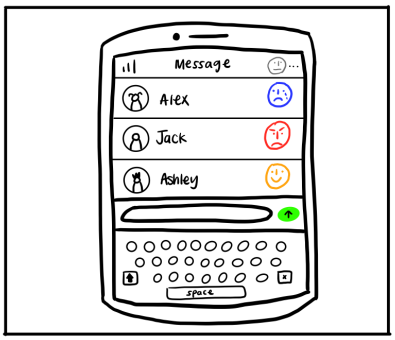
humanizing



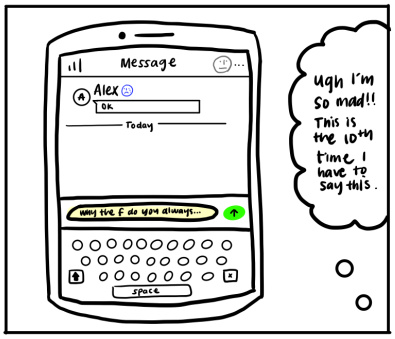
Tom is frustrated with Alex because Alex frequently makes a mess at their house and rarely clean up. So Tom decides to text Alex to show his anger and frustration.



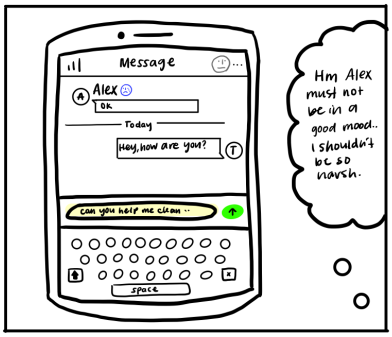
In order to text Alex, Tom opens his messaging app. This is his first time opening the app so it reminds him to indicate his current mood.



Once on the app, Tom is able to chat with his friends but also see their current moods/statuses.



Even within the chatroom, Tom is able to see his friend's current mood. Initially, Tom is so frustrated that he writes an angry message.



However, Tom sees that Alex is actually in a sad mood today. So Tom decides to write kinder, considering Alex's mood.

Figure 4.1: An example storyboard. In this storyboard, the messaging app prompts users to input their moods, which are visible to their friends.

Participants

A total of 98 new participants each evaluated all 12 storyboards. We collected data from 58 men, 39 women, and 1 agender person. Participants ranged from 22 to 65 years old (M=34.7, SD=9.0). The majority of participants were White (n=78), and the rest of the participants identified as Black, Asian or Pacific Islander, Native American, or a combination of different racial identities. Participants' education ranged from high school diploma or less (n=17) to postgraduate degree (n=8). A plurality of participants had a bachelor's degree (n=37).

Analysis

We performed quantitative within-subject analyses comparing participants' reactions across storyboards. To identify themes in aspects of the designs that participants valued and disliked, we used an inductive process to code the 1,176 open-ended responses. To do so, six members of the research team first independently coded the same small subset of responses, discussing potential themes as a group. Over seven weeks, the team met weekly, iteratively coding subsets of the data and refining codes, and, after finalizing all codes, coding the entire dataset. At least two coders coded each response in this final pass.

4.3 Results: Novel Designs and Evaluations

In interviews, participants brainstormed design ideas to support users while in the midst of a difficult discussion online. We clustered these ideas into 12 different design approaches (see Table 4.1). The design ideas were generated and analyzed separately from any particular platform. We used a repeated-measures ANOVA to measure the reactions (from very negative to very positive) of an additional 98 participants to the storyboards (see Figure 4.2). This revealed a highly significant difference in reaction to the 12 concepts ($F(1) = 72.45$, $p < .001$, $\eta^2 = .43$). This was mirrored in participants' responses to the prompt, "*I would be interested in trying [design]*" ($F(1) = 27.24, p < .001, \eta^2 = .26$). This indicates that, while controlling for individual differences, certain storyboards were viewed more positively than others. To evaluate which design concepts might be of interest to users, we ran one-sample t-tests on the responses to each storyboard, evaluating each relative to a hypothesized population mean of three (the neutral score on our five-point

Taxonomy of Design Approaches
Deleting Content. Deleting posts, comments, or other content that the user has created.
Blocking Users. Temporarily or permanently blocking a user or severing a connection.
Democracy. Leveraging community reactions to elevate content that promotes constructive dialogue, for example, through upvoting and downvoting, allowing users to flag posts as particularly constructive, or making algorithmic decisions in response to crowd input.
Humanizing. Building more empathy between parties by providing details about users, such as identity, background, current status, or mood, increasing the size of their profile picture, and preventing users from remaining anonymous.
Channel Switching. Providing the ability to move conversations from public to private channels or from text-based to voice or video calling. These were the most common interventions participants mentioned.
Emoticons. Adding emotional signals to the delivery of a user's message by adjusting their use of emoticons. These interventions included approaches like removing angry emoticons, prompting users to use emoticons, or suggesting emoticons based on the text of a user's message.
Censorship. Removing or replacing inflammatory content by suggesting word replacements, warning users with excessive word counts to prevent long-winded tirades, filtering particular words or parts of posts, and algorithms to filter out racial slurs.
Speed Bumps. Slowing down arguments in the moment, for example, by introducing a waiting period before a comment is posted or by enforcing fully reading a message before replying. These interventions sought to increase shared understanding between communication partners by nudging them to pay careful to their own words and the words of others.
Reflection. Detecting arguments and resurfacing them later to address regret users might feel, ask about the status of a relationship, or otherwise prompt them to work to strengthen or repair existing relationships. Users postulated that these designs might help users reconcile with friends once they have had time and emotional distance from an argument.
Reasoning. Providing users with facts that might encourage more shared understanding, such as tools for including data, connecting users to factual sources of information, and nudging users away from emotional argumentation and toward factual argumentation.
Rules of Engagement. Imposing restrictions on the way users interact, for example, by disabling caps lock, allowing only one person to type at a time, and enforcing turn-taking. Unlike censorship solutions, where messages were altered after they were submitted by the user, these interventions placed restrictions on the user as they composed their message.
Biofeedback. Leveraging biological feedback to better understand participants' experiences during arguments. By detecting their heart rate or skin responses, participants' interventions sought to provide just-in-time nudges to keep arguments constructive and remind participants of the effects of their words.

Table 4.1: Design ideas generated in interviews distilled into a taxonomy, listed from most to least positively evaluated.

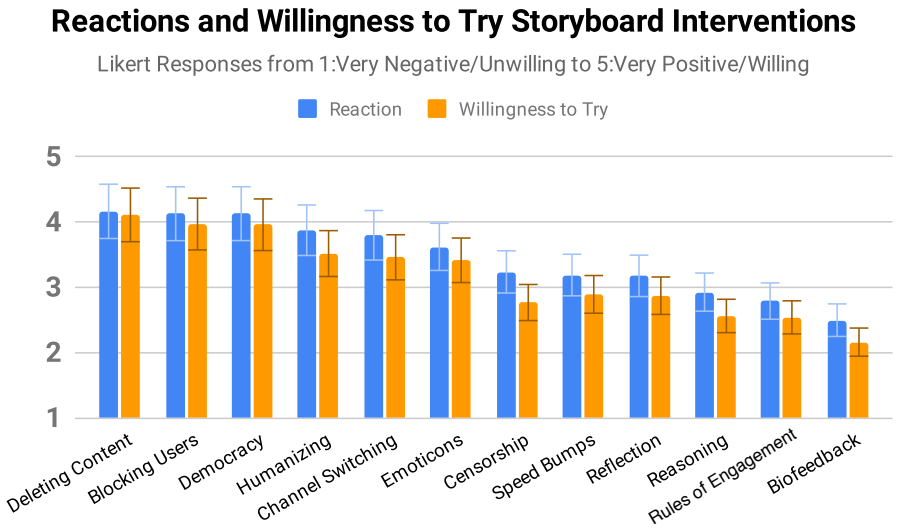


Figure 4.2: Reactions and willingness to try to storyboard interventions generated from taxonomy.

scale). Six storyboards had an average score that was significantly higher than this neutral score and represented the categories of: *deleting content, blocking users, democracy, humanizing, channel switching,* and *emoticons*. Several of these storyboards represented categories that are present in existing platforms, which may have influenced participants' reactions to them.

4.3.1 What Users Fear in Interventions to Support Constructive Arguments

We identified four themes from participants' feedback regarding the challenges of supporting constructive conversation through design. These concerns arose in response to many different interventions, suggesting they are inherent to the challenge of designing for online conflict, rather than any particular approach.

- *Dilution of intent*. Participants expressed concern that an intervention would dilute or alter their intended message. They explained that they did not want to use interventions that require sacrificing some of the meaning in their own messages or the messages of others because "*it means the conversation is not true and honest*." Participants were concerned about the storyboard for *reasoning*, saying, "*this is terrible in that it takes what the person is trying to say and essentially turns it into a form letter which no one likes.*" They pushed back on an intervention to enforce reading a message before responding to it (*rules of engagement*), saying, "*if you are trying to make a strong point, and the app slows you down, you might not be able to make your point as you intended*." In these cases,

participants explained that the purpose of these platforms is to allow users to authentically express themselves to one another, and impeding their ability to do so defeats the inherent purpose of the experience.

- *Backfire*. In response to many storyboards, participants expressed concern that the intervention intended to help might actually inflame the situation. Participants said that automation to resurface arguments and prompt reconciliation (*reflection*) might "*be adding salt to injury*," and a template to help structure dialogue (*rules of engagement*) would lead people to "*get more pissed off.*" They worried that *speed bumps* prompting users to pause and think would escalate the situation, saying that "*the person already in tension will become more[so] if the message is not sent immediately*." They also worried that a feature to *block* other users might make conflict worse, saying, "*blocking in the heat of the moment can cause more friction than necessary between friends*." And they worried about interventions that leverage *emoticons* saying, "*if anything, it might make things worse by implying a lack of seriousness in the topic.*"

- *Intrusion*. Participants pushed back on a variety of interventions because of the intrusive data collection that would be required. They explained that even designs they found promising seemed problematically invasive, for example, "*I don't think I would like to report my own mood. I think it's very intrusive as well and would rather people not know*," and, "*I still don't like that what you type is being monitored*." They raised concerns about using *biofeedback* to provide just-in-time support, saying, "*I think it is intrusive and creepy to detect someone's heart rate*."

- *Overkill*. Finally, participants disliked many interventions for their heavy-handedness, explaining that such interventions were not necessary to ensure strong interpersonal relationships, and the user should "*just say what they're thinking*." In these cases, participants described management from technology as, "*just unnecessary and too much*."

4.3.2 What Users Value in Interventions to Support Constructive Arguments

Despite these concerns, participants also appreciated many of the interventions, as demonstrated by their active interest in trying half of them. We examined their open-ended responses for themes in what they

found valuable in these designs:

- *Privacy*. Many participants said that they valued support for easy *channel switching* and moving conversations into a private space when they became heated, saying, "*I like that it intervenes to suggest taking the conversation elsewhere*." Although this theme only came up in response to channel switching, we chose to report it here because an overwhelming majority of participants demonstrated how much they would value having this support. Participants described many benefits of moving to a private space, explaining, "*this way, people don't get annoyed and included in ongoing discussion that doesn't really involve them*," and "*this would save a lot of people embarrassment from arguing in public*."

- *Empowerment*. Across interventions, participants said they appreciated when a design empowered them to customize their interactions and shape their communities, even as differences in opinion might persist. In response to *censorship*, which allowed users to filter out harsh language, one participant explained, "*I like the idea a lot. I'm offended by cursing and it causes me to lose sight of the message that they are trying to send.*" Other participants said that using *democracy* to mark others' comments and posts as constructive would be valuable "*because sometimes really good, constructive comments can get lost in the chaos*." Across interventions, participants valued nudges that helped the conversation retain respectful properties, appreciating when "*good messages gain visibility*" and expressed interest in designs that "*will help keep the conversation more civil*" by allowing them to take charge of the interaction.

- *Real Life Inspiration*. Participants appreciated interventions that drew inspiration from offline interactions and attempted to mimic aspects of productive in-person argumentation. Participants told us they liked seeing other users' moods (*humanizing*), saying, "*I like that it restores some of the social cues that we rely on in face-to-face communication, and that we miss in online chats*," and, "*it makes the chat more like real life where you interact with people's facial expressions, not just their words.*" Participants appreciated a mechanism to enforce reading messages before responding by comparing it to real life processes: "*I like that it is like active listening in a way*." And they appreciated the ability to delete content, saying, "*I like that it's an easy way to simply stop talking about an issue, like walk-*

ing away in person." In these and other instances, participants drew upon what they appreciate about face-to-face arguments and explained that they were interested in these attributes being translated to a digital environment.

- *Common Understanding*. Across interventions, participants told us they appreciated when the design helped users reach more common ground and appreciate each other's perspective. They liked when an intervention "*helps someone realize how their communication is being used*," and they were interested in trying a feature that resurfaces old arguments (*reflection*) because "*it makes sense to be able to go over the argument and see what you were even fighting about in the first place*." Many participants felt that emoticons would help participants cultivate a more precise understanding of each other's emotional state, saying things like, "*I think sometimes things can be misconstrued through chat, and emoticons are helpful in letting people know what the intent behind the message is*."

4.4 Discussion

Participants' concerns reflected the precariousness of carrying out an argument well: they worried that one misstep from an over-eager intervention would backfire and make an argument worse than ever, and they worried that any change to the meaning of their message would erode the shared understanding that people must work so hard to build when arguing. Thus, although they see a need for designs that support this scenario, they also make clear that *no* intervention is better than an intervention that backfires, illustrating the difficulty of engaging with this design problem.

4.4.1 Designs for Constructive Arguments

Our research shows that online arguments can be high-stakes interpersonal interactions, and people prefer to remain in control and responsible for using interventions during these delicate exchanges. Therefore, designers choosing to intervene should proceed with caution. At the same time, our results show that social media designers and researchers should not refrain from taking action either, as users were excited about the possibility for technology to help build more common understanding and to support their relationships.

Two of the most highly valued design approaches were *channel switching* to a private space and *hu-*

manizing others. *Channel switching* replicates a natural tendency participants already have to resolve disagreements privately, especially if they began in a group discussion or on a public platform. A salient feature enabling users to seamlessly move a discussion to a private messaging channel may help prevent unnecessarily damaging "comment wars" on public platforms [Fox and Moreland, 2015], and make it easier for users to save face, be authentic, and express sentiments that might make them feel vulnerable. Participants felt that *humanizing* other users by adding more details about their identity, mood, and background would help to prevent online conflicts from becoming toxic. These interventions may be more successful as persistent, ambient features that continually broadcast humanizing information, rather than just-in-time interventions that appear when an argument becomes heated. Because although it is possible to detect arguments from text [Misra et al., 2017; Swanson et al., 2015], doing so in real-time carries a risk participants identified of appearing "*intrusive and creepy*."

When assessing users' perceptions of the risks and benefits of design interventions, we found that users wanted certain information from others that they were not comfortable providing themselves. In fact, the highly rated *humanizing* and lowest rated *biofeedback* interventions displayed similar data to develop insight into others' moods, however, there was one critical difference. *Humanizing* displayed emotional data without specifying how the data would be gathered, whereas *biofeedback* illustrated how a user would enter their heart rate into the app. This suggests that users desire data from others that they paradoxically are not comfortable providing. In face-to-face contexts, people fluidly express or repress this non-verbal, emotional information through facial expressions, tone, and other subconscious gestures [Ekman, 2009; Gottman and Levenson, 2002; Mehrabian et al., 1971]. Turning non-verbal, emotional cues into explicitly shared data requires an additional level of conscious thought, trust, and acceptance of emotions that users may be disincentivized or even ill-equipped to provide if they are working to repress an uncomfortable emotion. For instance, it may be easier to subtly roll your eyes and sigh than to type that you are feeling exasperated into a mood prompt.

This demonstrates that further research is needed to explore types of human-centered emotional data that can be beneficially shared in online contexts, naturally and unobtrusively. Future work is also needed to inform why some users desire information that they are not comfortable providing. An exploration of how these conflicting desires would be negotiated between two users and how platforms could build a sense of

safety and trust around sharing such data could be greatly beneficial to forwarding an agenda of emotionally intelligent design. Therefore, in the next chapter, we explore more specifically how to *humanize* text-based private messaging conversations by exchanging tone of messages.

4.5 Conclusion

This work demonstrates that while people are optimistic about the potential for design to intervene during hard conversations online, the delicate context of working through online conflict must be treated with care by designers. We find that participants fear interventions that could dilute their intended message, backfire by making arguments worse, or unnecessarily intrude. Users are excited by the possibility of technology helping them reach more common ground during online conflicts, while also showcasing the need for caution when intervening in the midst of conflict. Of particular importance to this thesis is the design approach to *humanize* others online, combined with the insight that people prefer to have hard conversations on messaging platforms from Chapter 3. This work contributes the first step in a user-centered mixed-methods study to design, develop, and evaluate user-generated designs to support relationships during online conflict.

Chapter 5

Creating Daffodil Messenger

As a result of our interviews, survey, and storyboard evaluation, we had several ideas on how design could help users navigate conflict. As a research team, we met over many months to discuss these ideas, ultimately combining and discarding ideas until we had selected two design interventions, incorporating the ideas of *privacy*, *humanizing*, and *real life inspiration*. Here, I describe our process of designing and evaluating these interventions as intended for a web messaging application. First, I describe our initial design process, including design sketching and ideating, followed by the creation of high-fidelity interactive design prototypes, and initial interview feedback. Then, I describe the process of implementing these designs into a web application called Daffodil Messenger, along with initial feedback from pilot participants.

Colleagues and I created two design interventions: tone tagging and pausing. Tone tagging allowed users to select messages and provide additional emotional context as to how the message was intended. Pausing allowed users to select specific messages to pause and return to during a conversation. Our users enthusiastically embraced the tone tagging intervention, saying it would clear up many miscommunications. They highlighted how it would be especially helpful when someone was being sarcastic. When implemented in Daffodil, our users said it could be helpful because it is so difficult to get tone from text-based messages, and they would like to use the platform to communicate with their close friends and family. They said that they were often guessing at how messages were meant when they were texting.

Many of the users also liked the idea of pausing a message, saying it felt better than knowing someone had seen their message and left it unanswered. They said it would help keep conversations more organized

as well, allowing them to explicitly say when they had to focus their attention elsewhere, whether that was a different message or something outside of the text conversation. However, they also said it may feel better to receive that information via text rather than through a design affordance, and it may feel worse for the pause feature not to be used once it was available. It created some additional accountability for our users that made them both optimistic and wary.

5.1 Background and Motivation

My prior work in Chapters 3 and 4 demonstrated that users 1) primarily preferred to engage in online conflict over messaging platforms, 2) had a preference for interventions that *humanized* each other, and 3) appreciated when design interventions allowed them to replicate behavior they already do offline. Therefore, we decided to focus on designing interventions that built on these themes in the context of 1:1 messaging online for hard conversations in close interpersonal relationships.

There is a surprisingly small portion of research that investigates online conflict in this context. Scissors and Gergle [2013] reported that couples naturally integrate face-to-face and computer-mediated communication into their conflicts, with many saying it was easier to initiate a conflict online and then resolve it offline. Scissors et al. [2014] demonstrated that communicating via text messaging during conflict (compared to face-to-face) was associated with lower self-esteem and increased distancing behaviors [Hess, 2000]. This reinforces the need to support people during conflict in their close interpersonal relationships through digital design, as they may be more prone to relationship-eroding behaviors. Past research has shown that design shapes norms and communication online [Sukumaran et al., 2011; Kriplean et al., 2012a,c; Zheng et al., 2021], highlighting the potential benefit of this approach.

Therefore, we developed two design interventions to help users. The first was to incorporate tone into text-based messages. The second was to pause a message ("simmer") to communicate when one needed to step away. We chose these specific interventions through a user-centered design process, in which our goal was to increase attunement during conflict online. Part of attuned communication is feeling felt, heard, and seen [Siegel, 2007; Erskine, 1998] and responding to bids for connection by turning toward one another [Driver and Gottman, 2004]. By creating a process in which users could request each other's tone, users could explicitly signal turning towards each other and a desire to more deeply see and know each

other's experience, facilitated through design. Additionally, by explicitly stating a need to pause a message, participants could more deeply understand the experience of the other person, and it could remove much of the guesswork users currently undertake when there is an unspoken pause in a conversation.

5.2 Designing and Evaluating Interventions to Support Users During Conflict

First, I describe the process in which colleagues and I produced high-fidelity prototypes of the tone tagging and pausing ("simmering") interventions and solicited user feedback.

5.2.1 Designing the Interventions

We designed two interventions intended to help with: 1) communicating tone and 2) facilitating a pause in the conversation. We selected these because users in Chapter 4 wanted to incorporate more contextual details and emotional context into their conversations, and they valued designs that allowed them to replicate behaviors that they may already do offline.

To translate these concepts into concrete designs, I met with a team of designers for collaborative design sessions over the course of several months. We first worked towards one of our main goals of helping people incorporate more nonverbal information into the digital sphere. We further specified a desire to include text-based information that helped communicate emotional states. With regard to pausing, we identified that many participants in Chapter 3 appreciated the fact that using asynchronous communication allowed them to step away from a conflict and return on their terms. However, this simultaneously could promote misattunement, as people were left uncertain as to why people did not immediately reply. Therefore, we determined that a lightweight way to communicate the need to pause could be useful.

Once we established these two interventions to focus on, we structured our design sessions by first selecting one intervention to work on per day. We each took 10-15 minutes to rapidly develop 3-4 rough sketches of different designs to support the target action. We then joined together to present each of the sketches, discuss what worked well, and which of the sketches we wanted to continue evolving. Once we had agreed on a concept for the design, one member of the research team generated a high-fidelity prototype

in Figma[1]. We then collectively reviewed these prototypes for visual design and flow. Each member of the team had an opportunity to give feedback, which we incorporated into subsequent revisions of the design. These are shown in Fig. 5.2 and Fig. 5.4.

5.2.2 Evaluating the Interventions

To evaluate the interventions, we conducted semi-structured interviews with 14 social media users, in which we used the design prototypes to elicit deeper reflections from users.

Procedure

Each interview began by explaining that we would be walking through four distinct scenarios, which would all take place in the context of a fictional argument between two people about how to address climate change. We asked participants to reflect on these as if they were having this conversation with someone they knew. In random order, we sequentially displayed each of the interventions, briefly explaining its intended purpose before doing so. The interventions were displayed as high-fidelity mock-ups in Figma, with added interaction effects so that users could see how selecting certain buttons would result in changes in the interface. We then probed to see whether they thought they would use these interventions themselves in a real messaging experience, how they would feel if their friend received the intervention instead, and potential unintended consequences of the intervention. Sessions lasted approximately 45 minutes.

Participants

We recruited 14 social media users from social media, email lists, and word of mouth. There were 6 women and 8 men, and the average age of our participants was 28 ($sd = 5.3$). Five participants identified as White, four identified as Black/African American, and five identified as Asian or Asian American. All of our participants were required to have been involved in an online argument with someone they knew offline in the past year. Five of these participants indicated that they had some past experience with design. Participants were compensated with $20 Amazon or Tango gift cards.

[1] https://www.figma.com/

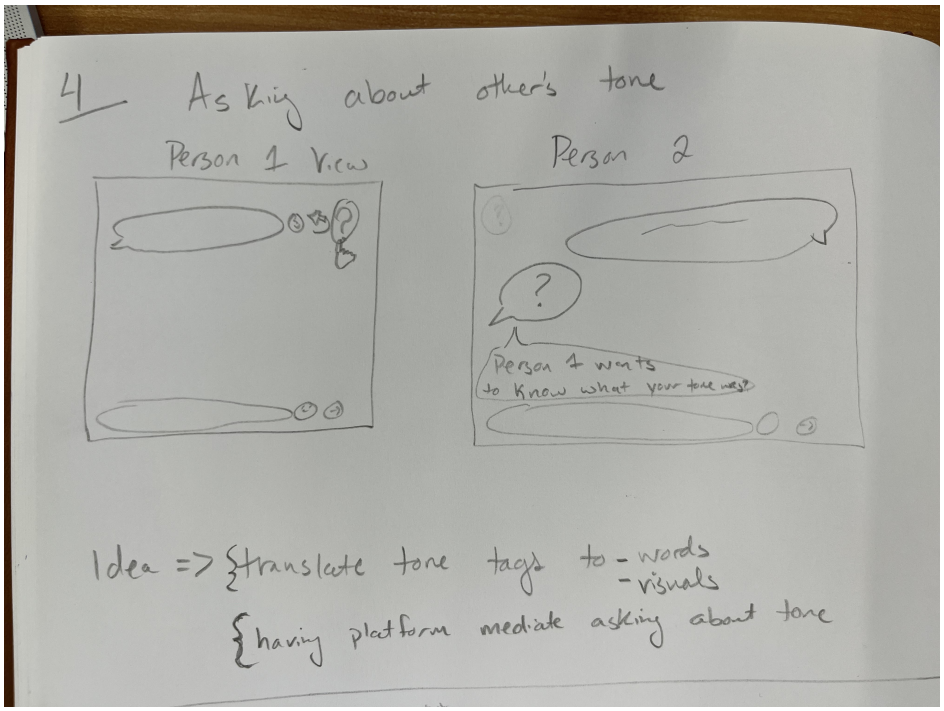


Figure 5.1: This early idea in design sessions showed the idea that the platform would allow people to also interactively ask for each other's tone in messages.

Analysis

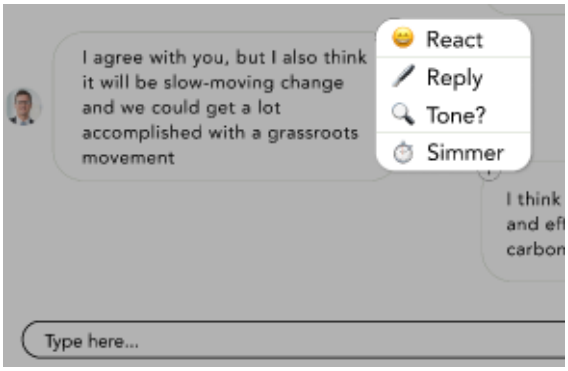
To analyze these interviews, four researchers reviewed the anonymous transcripts, in which three researchers reviewed three transcripts each, and one reviewed all of the transcripts. They then discussed the most prominent themes across each of the four interventions. One researcher then went back and re-analyzed all of the transcripts using these themes. Below, these user quotes are prefixed with 'P.'

5.2.3 Tone Tagging

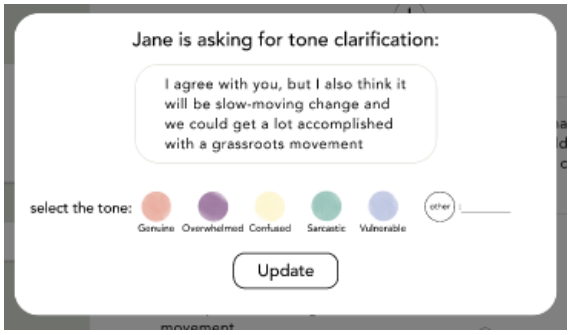
Design Intervention

After a few rounds of design sketching as a team, we decided on the interaction shown in Fig. 5.1, which displays an interactive approach to ask someone for their tone, as we wanted to support both parties in both communicating their own tone and asking about their partner's tone. We felt that it was important that this intervention would be bidirectional – both self-initiated and other-initiated. Therefore, we designed the intervention displayed in Fig. 5.2. In this feature, we start in the frame shown in Fig. 5.2a, with the user

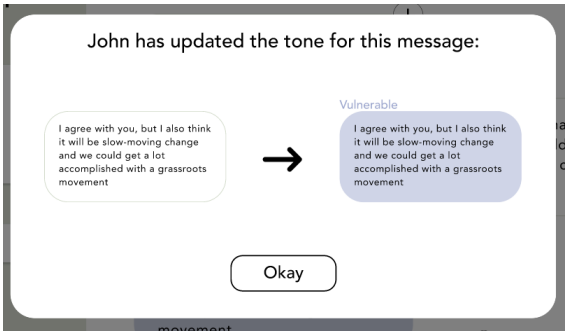
selecting a message and opening a menu of ways to interact with that message, including requesting the tone. Once the user selects "tone," the *other* person in the conversation is prompted to select a tone for their message, as shown in Fig. 5.2b. Once selected, the message is updated, as shown in Fig. 5.2c, with the text label naming the tone and tone-specific color applied. Upon returning to the main chat screen in Fig. 5.2d, the user can send messages as normal, with the tone-tagged message now visually altered. We made the decision to add both a text tag and color change because it was important for the update to not be missed by the other user, and text alone was not visually sufficient.



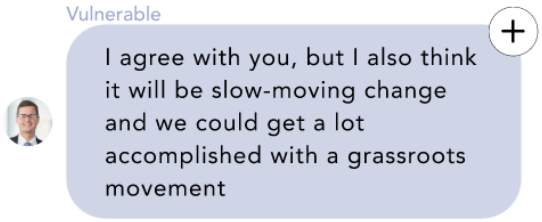
(a) Users can select a message and select to reply, emoji react, tone indicate, or simmer. In this case, Jane is asking for tone on John's message.



(b) Switching persepctives, John now sees this notification and is prompted to clarify the tone.



(c) From Jane's perspective, when John updated the tone, she is notified in this pop up window.



(d) The tone is then reflected in the list of messages with a permanently updated color and text tag to both Jane and John.

Figure 5.2: The high-fidelity tone tagging interaction. Note that Fig. 5.2b displays the intervention from John's perspective, and all others are from Jane's perspective.

User Feedback

Users thought that tone-tagging was "*awesome*" (P2) and had the potential to help clarify confusing communication and even bridge the communication barriers that currently led them to switch to phone or face-to-

face discussions. P7 said "*It would allow people to gauge the tone instead of making guesses.*" Other users echoed this saying, "*I think it's great if someone puts their tone forward, because a lot of our conversations get lost in translation when it's done online*" (P14). In some situations, they anticipated that tone-tagging would lower the barrier to communicating their emotional state, as P12 said, "*I guess I'm a socially anxious person or don't fully understand social situations, so it [tone indication] would be helpful to me.*" Overall, many participants *wanted* to know how the other person felt during the conversation saying, "*Somebody's angry with me, it's best I know. He's happy, it's best I know. He's being sarcastic with me over the chat, it's best I know*" (P2).

We probed how our participants would feel if they sent or received a message tagged with a tone that was sarcastic, frustrated, or otherwise different from their expectations. They said in some situations, receiving a tone that was unexpected was "*a good thing, and it would help mitigate any kind of turmoil that could have arisen from that*" (P5). In other situations, "*I'll feel disappointed. Then if it's something I need to apologize [for], I'll do that immediately*" (P2). Similarly, P13 said "*I think it would definitely make me think more carefully before responding because instead of me just inherently inferring their tone, I already know it. So if it's a negative tone, it could definitely help me tailor my response to respond to that.*" They also said "*If it was frustration, I would try harder to help the person process it better*" (P6) and "*I'll... try to notice what led to the frustration and will try to resolve [it]*" (P4). However, others were less forthcoming with their emotions, as P1 said "*I won't respond... Literally, when I'm frustrated I just leave.*" This indicates that while tone tagging could help in many situations, some users would likely want an option to easily ignore requests for tone.

Users also had some misgivings about tone tagging, worrying that it could be weaponized or used in a disingenuous way. While in some situations, receiving a sarcastic tone could feel like "*the funniest thing ever to happen*" (P1); in other situations, if a user were feeling sarcastic, they anticipated they would "*mark it as genuine when it was really not*" (P7). In the worst case scenario, P8 wondered, "*Okay, are you just using this as an additional tool to gain rhetorical leverage over me by misrepresenting your feelings?*" Some users also say that in situations where they already know someone is feeling bad, it could make them feel worse:

"*Probably in those cases I may not even want to know that they're frustrated, because I think*

underneath I would know that they are, but on the face of it, I would not want to be told that they are, I guess. It would make me feel worse. So I probably wouldn't want that because you kind of know that they're conversing and then you can tell that they are probably frustrated, kind of obvious, but then having that rubbed into your face, you may not like that. I mean, I may not like it. It may feel worse." (P11)

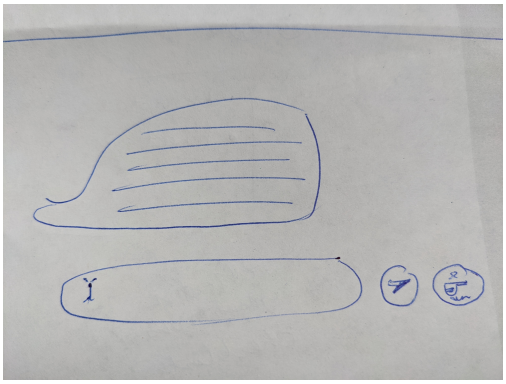
Finally, some users were concerned that it would interrupt the flow of the conversation, saying "*It doesn't feel like it is super natural, or like it would be easy to incorporate into conversation*" (P12). P14 similarly said "*If the conversation is flowing, I'm not very sure if people are actually going to go back and select the tone for every message.*" So overall, users were excited that this intervention could help their conversations, but simultaneously some had misgivings about how it could lead to heightened confusion or slow down the conversation.

5.2.4 Pausing and Returning to a Message

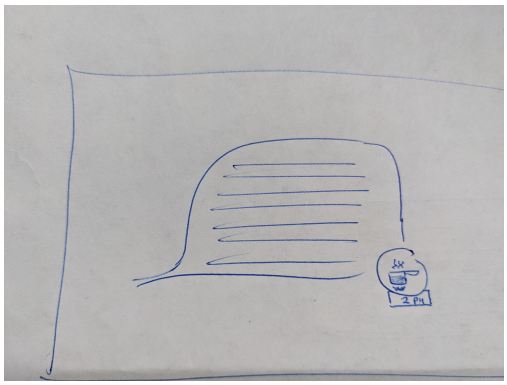
Design Intervention

Due to the prevalence of users both liking asychronous conversations and disliking having to guess about when they might receive a response, and users' desire for design to replicate behaviors they do offline, we decided to explore how an intervention could help users pause when needed during conflict. When we explored this in a design session, we focused on metaphors such as "keeping something on the backburner" and returning to it later, and letting something "simmer." This inspired our first round of designs as shown in Fig. 5.3. In these messages, we first thought about the idea of sending a message with an option to "let it simmer," as shown in Fig. 5.3a. We used the visual icon of a pot to keep in line with the "backburner" and "simmer" metaphor. The idea was that when a message was sent with a simmer, it would indicate that the user needed to pause and step away from the conversation for a set amount of time. As shown in Fig. 5.3b, the other user would receive the message with a simmer tag, and when the user was planning to come back to the message (in this case, 2PM).

As we refined the idea, we realized that users should also be able to indicate that they needed to pause and come back to both messages they sent and ones the *other* person sent. Thus, we developed the interactivity as shown in Fig. 5.4a, in which a user is selecting to "simmer" a message. The user then is able to enter



(a) This shows how a user could send a message with a "simmer," as a lightweight way to let the other person know they needed to pause and would return later.



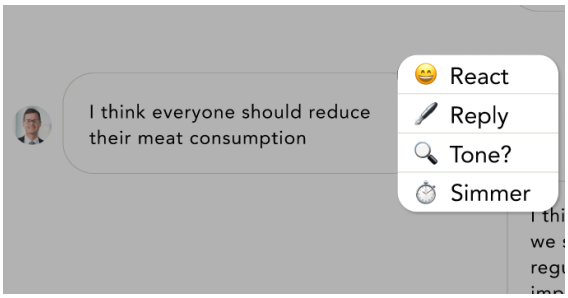
(b) This shows how a user could react to someone else's message with a "simmer," indicating they would return at 2PM.

Figure 5.3: In early design sessions, we came up with the idea to indicate that a user needs to pause and return to a message, which we called "simmering" using the visual metaphor of placing something "on the backburner."

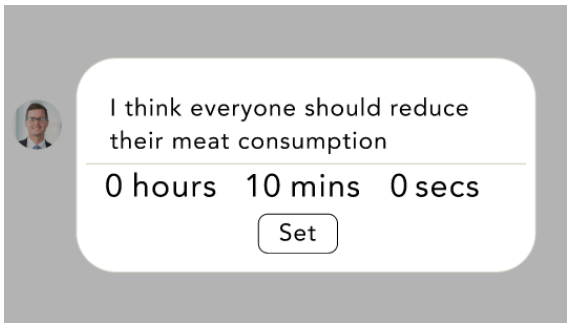
an amount of time that they want to let the message simmer for, after which point they will be reminded by the interface to return to the message (Fig. 5.4b). Once this occurs, the other user also is notified that the message is being left to simmer (Fig. 5.4c), and both users see the tag of a clock icon next to the message, with a timer counting down the time remaining for the message to simmer, as shown in Fig. 5.4d. Users are not prevented from sending messages in the meantime.

User Feedback

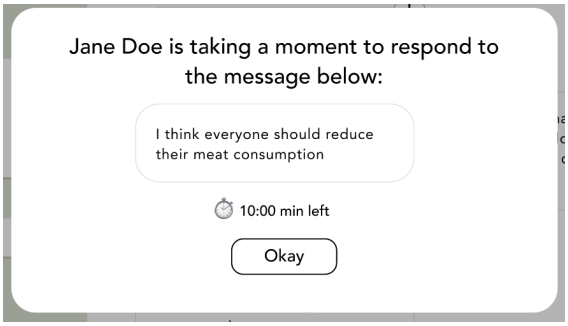
Users naturally felt that they would incorporate pausing into their online conversations, and many felt that this intervention could be beneficial. As P4 said, "*this feature will help me a lot because sometimes I don't like ignoring message, but sometimes I just have to ignore because at that moment, I don't have much time to reply to those conversations. So with this kind of feature, it'll make me tell the sender of those message that, okay, in a couple of minutes, I'm going to reply to your text. So to me, this feature is great and nice*." People similarly felt like seeing that someone else had left a message to "simmer" was "*better than them just ignoring the message, and not replying*" (P6) and indicated that the other person wanted to "*give me a quality response*" (P4). P13 said that "*Sometimes when I argue with my boyfriend and he takes a long time to respond, I want to know if he's distracted or if he's just taking a long time to respond, so that could*



(a) Jane first selects a message she wants to simmer.



(b) Next, Jane enters any amount of time she wants to simmer the message for.



(c) John is notified that Jane is taking a moment to respond.

(d) Both John and Jane see the message with a clock icon and the time left on the simmer until the time ran out. Users could still send messages in the meantime.

Figure 5.4: The simmer intervention. Note that Fig. 5.4c is from John's perspective, and all else is from Jane's perspective.

be useful." Users also said it could help in situations where someone is online but not able to talk, saying "*I'll prefer they simmer the message rather than opening the message and not responding to my text*" (P3). Similarly, P11 said that such an intervention could have been useful to them when, "*I didn't know whether they were reading the messages or simply I was being ghosted. And they just took a break and they just went away. And I felt like that was super, super anxiety causing for me.*"

However, others said that messaging affords them the ability to take a break without communicating it, with no added disruption to the conversation. P6 said, "*I'll just leave it unsolved and I would not talk about it anymore,*" indicating that when a conversation gets too intense, they'd rather not revisit it afterwards. However other users did not like the idea of being left without communcation, and "*if they didn't know you took a break and then you just stop responding to them, that could also make them feel like you don't care or something like that*" (P13) highlighting how simmering could help communication.

Others "*could also imagine wishing that they would just tell me that via a message, as opposed to using*

separate affordance for that" (P8). Similarly, another user thought "*it could also escalate the argument, depending upon how the person takes it*" (P12). One user even said

> "*There's a little bit of a stigma associated with admitting that you're emotionally wrapped up in something. Clearly, that stigma is problematic in and of itself. But the beauty of having a conversation like this on Messenger is if you don't respond, in many situations I think, especially with read receipts, it gets a little bit more complicated, but if you don't open the message... You can just not respond for an hour or two. And if it's in the middle of the day, the person that you're talking with might just assume that you have a Zoom call, or you could even be like, 'Hey, sorry, I got to get on a meeting,' instead of being like, 'Actually, I don't have a meeting, but I just am too pissed off to want to keep on talking about this right now.*"" -P8

In this case, users highlighted that the emotional vulnerability that initiating a simmer implies would be a deterrent to using it, as they would rather simply leave the conversation and return once they were ready.

Finally, people were concerned specifically that the timer might lead to some friction. P5 explained that "*I don't like being beholden to a timed response on a message where things can be very nuanced*" and "*having a deadline on that doesn't feel right*." Similarly, P8 explained that "*it's hard to estimate ahead of time exactly how much time you need*." Overall, it appears that users appreciated the idea of someone else letting you know that they needed some time to respond, and it alleviated the rejection that some might infer from other online affordances (such as online status indicators and read receipts). At the same time, others thought that it would be better for users to simply tell each other in a message when they needed to step away, or take that space without communicating it at all.

5.3 Implementing Daffodil Messenger

Given this feedback, we decided to take the designs we had created and implement them so that we could test them with users *in situ*. First, we updated the design concepts for tone tagging and simmering, which we renamed to pausing. Next, we implemented these designs into a web-based messaging platform named Daffodil. Finally, we piloted this system with two participants to elicit their feedback on the designs.

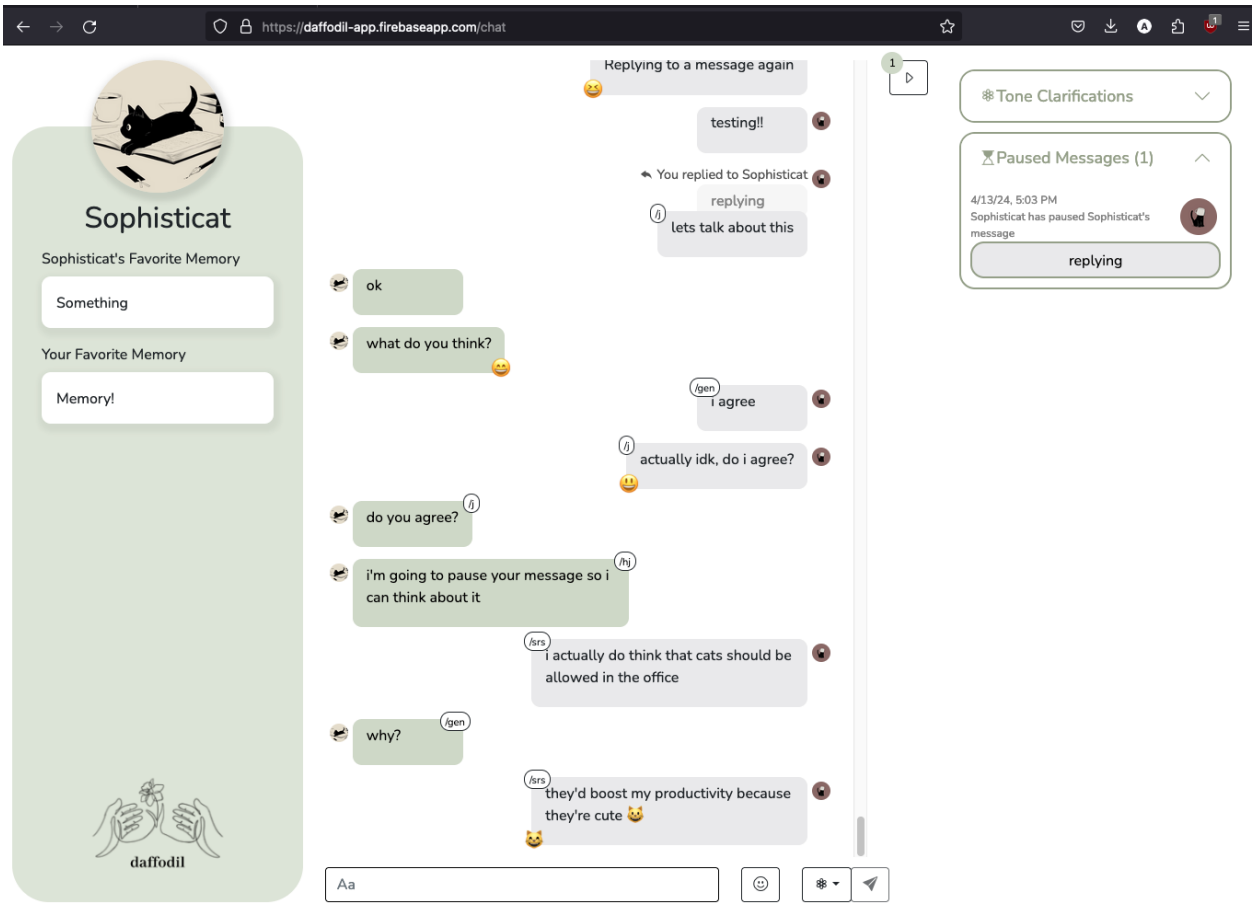
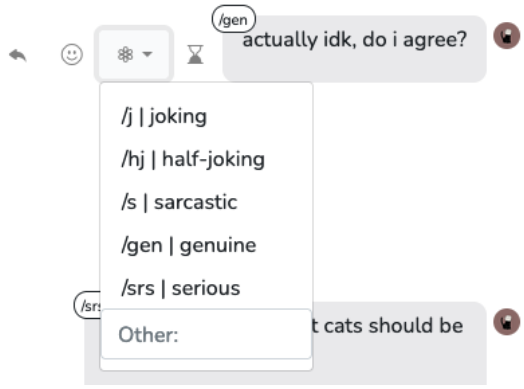
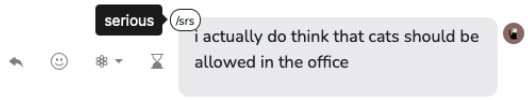


Figure 5.5: The Daffodil chat system includes a left sidebar, messages, and a right sidebar. On the left sidebar, the other user's information is displayed, including their name, profile photo, and a favorite memory with the person they're chatting with. The current user's favorite memory is also displayed. The message list contains messages from both parties, as well as options for emoji reactions, tone tagging, pausing, and replying to specific messages. The right sidebar is collapsible and contains paused messages and unanswered requests for tone clarification.



(a) Users were able to select a tone from a dropdown to either update a message or send with a message.



(b) The entire word for the tone would be shown when users hovered over the shorthand tone.

Figure 5.6: Users are able to tag their messages' tone either before or after sending by selecting an option from a tone drop down or entering a custom tone.

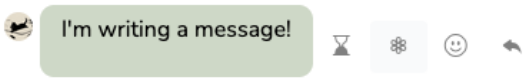
5.3.1 Updating Designs

To account for user feedback, we revisited the designs for tone tagging and pausing. This resulted in the creation of Daffodil, as shown in Fig. 5.5.

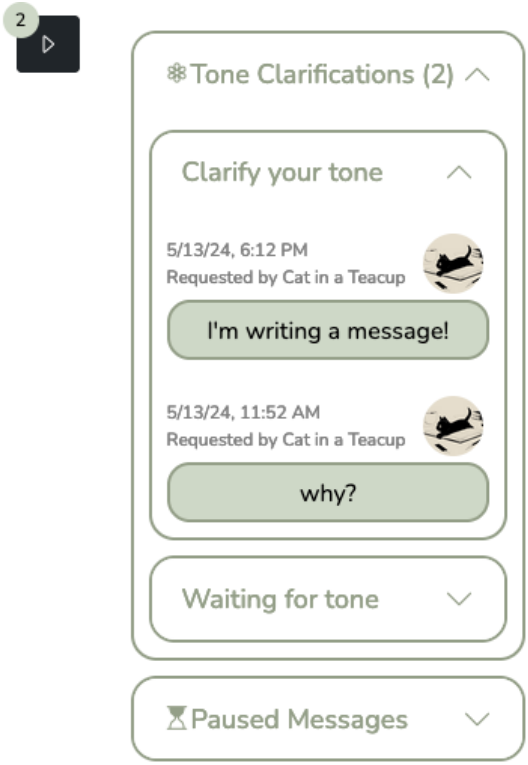
Tone Tagging

The first change we made was to offer tones tags as tone indicators, a popular form of indicating tone already in use on platforms such as Twitter, Reddit, and YouTube [Marcus, 2020; @ranlaugh]. These tone tags include a shorthand text starting with a backslash, such as `\j` for joking, `\s` for sarcastic, and `\srs` for serious. Fig 5.6 displays the interaction for users to update their own tone. Users could select from five popular tone tags, or enter their own custom tag, in which the first four characters would be displayed, as shown in Fig. 5.6a, and the rest would be shown when hovering over the tone tag, as shown in Fig 5.6b.

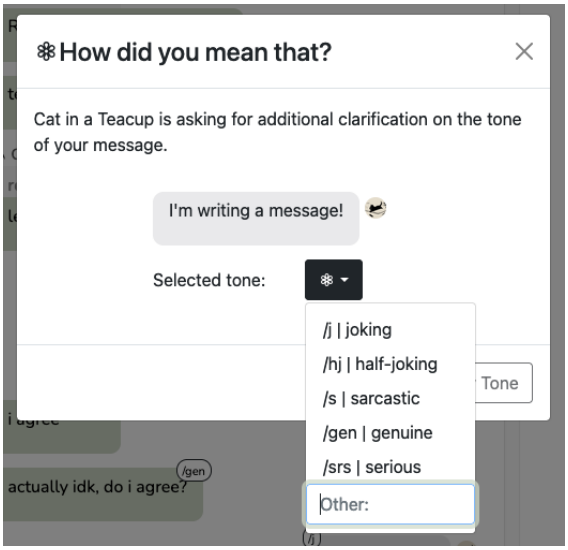
We also added an interaction in which users could request tone, as displayed in Fig. 5.7. First, users could request the tone of the other user's message, as shown in Fig. 5.7a. Next, the other user would receive a toast notification that they had a tone request to reply to, and they could open the tone request in the right sidebar, as shown in Fig. 5.7b. Once they selected and applied their tone (Fig. 5.7c), it would be displayed to both users (Fig. 5.7d), and the requesting user would receive a toast notification that the tone had been updated. Allowing for users to interact to both provide their own tone and ask for each other's tone allowed



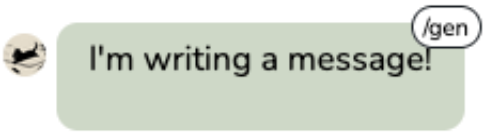
(a) Users could hover over a message to request a tone.



(b) Once requested, the other user would see the tone request in the right sidebar.



(c) The user could then select the message from the right sidebar, which would open a dialog box to select a tone.



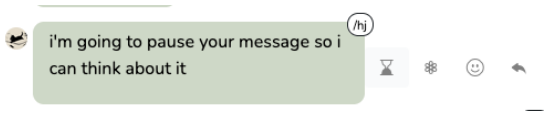
(d) Once applied, the requesting user would receive a toast notification that the tone had been updated, and both users would be able to see the tone.

Figure 5.7: In addition to updating one's own tone, users could ask each other for the tone of their messages.

for humanizing information to be a user-initiated process, which we hoped would alleviate user fears of intrusion from Chapter 4.

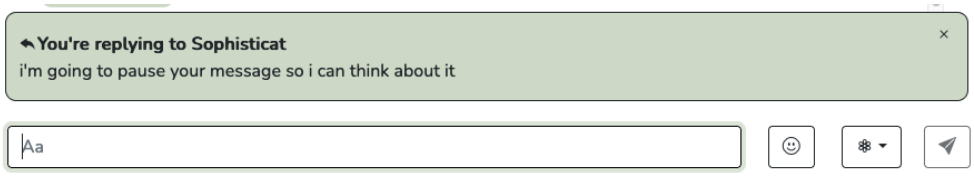
Pausing

To account for users' feedback on difficulty predicting time needed during a pause, we removed the timer from the pausing interaction. We additionally replaced "simmer" with "pause" for simplicity. As shown in Fig. 5.8, users could first hover over a message to select an hourglass icon (Fig. 5.8a). Once clicked on, the message was greyed out, with a display that stated the message was paused by the user's name (Fig. 5.8b). Once the user who paused the message unpaused it, they were prompted to reply in a message thread (Fig. 5.8c). Users could view paused messages in the right sidebar, and when clicked on, they would scroll to the message.



(a) Users could pause messages by selecting the hourglass icon next to a message.

(b) Once paused, the message would be greyed out, with a description of who had paused the message. The message would then be visible in the right sidebar.



(c) When unpaused, users would be prompted to reply in a thread.

Figure 5.8: The paused message interaction allowed users to pause each other's and their own messages. This did not prevent users from sending messages in the meantime.

5.3.2 Implementation

I, along with my collaborators, implemented these designs using HTML, CSS, and Javascript. We used the React and React Bootstrap libraries and a Firestore database. The code repository can be found on GitHub [2]. The platform may be found at `https://daffodil-app.firebaseapp.com/`.

[2] `https://github.com/amandabaughan/daffodil-messenger`

5.3.3 Pilot Studies

We ran pilot studies with two participants, one non-binary, and one woman. Their average age was 31 ($\sigma = 4.24$), and both participants were White. During the pilot, each participant engaged in a disagreement with the author on Daffodil. At the conclusion, I interviewed the participants on Zoom and asked them for their opinion on the platform in general, and each of the specific features of interest: tone tagging and pausing. Each interview lasted roughly 20 minutes, with the entire process lasting approximately one hour.

Analysis

Interviews were transcribed automatically by Zoom and analyzed by two researchers. Each researcher did an initial reading of the transcripts, followed by open coding. The researchers then met to discuss and refine codes. Once completed, the researchers read the interviews a second time to sort quotes into the closed codes. Participant quotes are prefixed by 'P' below.

5.3.4 Results

Overall, participants said they "*liked*" using Daffodil for discussing a disagreement (P1). They liked tone tagging for the additional clarification it gave messages and pausing for how it helped keep the conversation organized.

Tone Tagging

Participants said that it was "*so cool to have the ability to check in on tone*" and "*it felt very easy to use*" (P2). P2 felt it could alleviate difficulties in asking for how something is meant,

> "*There were a couple of moments where I was like, 'I don't know what they are actually saying,' and rather than having to type in 'What did you mean by that?' which sounds really aggressive, I could just like ask for a tone indicator, which is really nice.*"

They elaborated that "*it takes away the fear of how that question is going to be perceived*" (P2). P1 had similar sentiments, saying "*I was actually just having this conversation with someone about how you know it's super hard to figure out someone's tone over text, and like, a lot of things, can be misinterpreted.*" They

said, "*There was at least 1 point in the conversation where I was like, 'I like this.' I [said] 'yikes,' [during the conversation], and that totally could come off as a huge insult, or just kind of like a playful jab, depending upon whichever way that you wanted to view it and interpret it*" (P1).

P1 discussed how tone tagging and requests were a "*preemptive de-escalation*" in conflict. They said "*It puts the cat back in the bag before things get out of control, and you have to do some serious damage control. Especially like in the context of, if the argument is a little heated, or if you're doing something serious where there is like a pretty big, genuine risk of people's feelings getting hurt.*" They also said that tone requests were "*a good feature*" for self-reflection because "*in instances where you asked for my tone, I go back and re-read what I said and reprocess it. And it gives that that instance of self reflection that I wouldn't normally do.*"

Both participants stressed the importance of relational context for using tone tagging, saying "*I don't know how it would work is like in a more anonymous setting*" and "*trolls could figure out some way to abuse it*" (P1). Both participants said they would want to use the platform with their partner or close friends. "*I wouldn't use it with somebody that I didn't know very well. Unless I was specifically trying to get to know them to be like a friend*" because "*You have to actually care that the person you're talking to is understanding how you feel*" (P1). P2 thought it would help with "*generational gaps*" because "*with my parents, I have a hard time understanding what their tone is, even though I know them super well.*" P2 also cited how it could alleviate miscommunications with their partner, saying,

> "*My partner is not autistic, and I'm autistic. And sometimes tone gets mixed up when we text, and it's something that we work on. We work on being super clear when we text, because we sometimes will miss the mark with each other... It would be very great to have this to talk to [my partner] specifically.*"

P2 also spoke about how they used iMessage message reactions, saying "*I use the reactions as tone indicators sometimes*." They elaborated,

> "*Let's say my friend sends me a joke. I can react with a little haha emoji, or whatever with to the message. But I'm guessing whenever that happens, I'm like, actually, I don't know if this person is making a joke at all. It could be so very serious, and I could be in danger of laughing*

at their pain. So I need to be extra careful. So a lot of times in texting. I'm just guessing what their tone indicator is, even for close friends. I'm guessing all the time."

P2 concluded, "*I wish that this was on iMessage. I think that would be amazing.*"

Pausing

Our participants said that pausing helped with staying organized and alleviating anxiety. Both participants said that text conversations can be overwhelming at times, and described slightly distinct but related ways that they would use the pause feature to stay on top of their conversations. P1 said,

> "*I really like the pause feature, especially when we were talking about one thing, and then you asked me a question about the other thing I was like, 'I'm gonna pause that.' I'm like, keep this conversation going, and then I'll like reply, back... This platform was nicer [than threaded replies] cause, like I could hit the pause on it, and then it was really easy to track down.*"

For P1, pausing was a way for them to remain organized in their thoughts on the platform and not lose sight of the points they were making. P2 said, "*There are some days where I'm texting with so many people, and they send me something that I have to get back to, and I would love the ability to pause it and let them know that I've seen it, but that I'm coming back to it so they don't feel like I'm leaving them in the dark.*" They continued that "*It's a nice way to be like, 'I'm so sorry I'm super busy, but I promise I'll get back to this soon'.*" P2 also liked the right sidebar, and said it was "*the most useful feature... to see all of the messages that you've paused in a single list*." They said they would treat it like a "*to-do list*."

Participants also felt that pausing alleviated some of the anxiety inherent to long gaps during a difficult conversation online. P1 said

> "*I do like when you were paused [and said] 'I'm going to get drink of water, going to the bathroom,' or something. I mean, I've been in so many conversations, because I have anxiety, where I have said something, and somebody who's been responding fairly consistently, right after suddenly, like takes 10 min and doesn't respond. And you're like, 'Oh, shit! What did I say?' Especially like, you know, when you're a little insecure with like your friend group, or*

you like, have new friends, or people you haven't seen in a while, or the stakes are a little bit higher. Like, you know, that gap can feel pretty huge."

However, P1 also acknowledged that if the pause feature was available and people did not use it, "*then it's like twice as devastating*," since they had the option for that communication. In this instance, it could especially be understood as *turning away* by the other person. So they concluded that "*I would like using it. I'd be a little bit wary of like other people using it.*" P2 said it helped that during the pilot, I had additionally "*clarified that you were going to get some water*" because "*to me the pausing feature is two different things. It's 'I can't answer this right now because I don't know how to,' or 'I'll be right back, I need to go do something.*'" They continued that "*I appreciated that you clarified that during the session, because [otherwise] I would have been like, 'where did Amanda go?*'"

5.4 Discussion

Our data suggests that being able to easily ask for and communicate tone, as well as communicate the need to pause, creates experiences of deeper connection and attunement, so much so that both of our participants would like to use these features in their every day messaging platforms. Below, we discuss concrete steps platforms can take to address users' needs, how these needs have already been addressed on some platforms, and how users can begin to take advantage of our findings in the absence of design support.

5.4.1 Communicating Tone Online

Communicating tone online can be confusing, especially when it comes to sarcasm. Both humans and natural language processing models have difficulty understanding when something is intended sarcastically or not with text alone [Mehrabian, 2017; Bamman and Smith, 2015; Rajadesingan et al., 2015]. Due to this gap in support, users have come up with their own innovations for communicating tone on platforms like Twitter, called tone indicators [Christanti et al., 2022; @ranlaugh; Marcus, 2020], which we utilized for our implementation of Daffodil. Tone indicators come with their own norms, such as "*do not purposefully use tone tags incorrectly 'as a joke,' to confuse people, etc. the point of tone tags is to clarify.*" These norms address one of our users' fears around tone tagging, that it would be abused by trolls, providing further

evidence for the generalizability of our findings.

Overall, our participants seemed to like the sense of clarity and closeness that tone tagging would afford them, providing evidence that this intervention would build greater *attunement* between people during hard conversations online. This study also provides evidence that users *want* a deeper sense of attunement with their loved ones online, as they enjoy knowing how the person they are talking with is feeling and means what they say. As attunement primarily revolves around a *reciprocal* process of mutual understanding [Erskine, 1998], allowing users to request tone is a key feature that current messaging platforms could benefit from. Although users can already provide tone requests, more design support is needed to facilitate interactivity to request tone.

5.4.2 Pausing and Pacing in Online Conversations

We found that asynchronicity was one of the key reasons people turned to computer-mediated communication during conflict. This is supported by past research (see Chapter 3). However, this became fraught with anxiety when people considered 1) the impact of someone leaving suddenly during the conversation and 2) how they felt about the other person knowing that they had read their messages and needed time to respond. However, users indicated that letting the other user know that they were taking a break alleviated their anxiety, and they would happily allow the other person to take their time to return with a quality response. During pilot sessions for Daffodil, participants highlighted that it was helpful that I both paused a message and verbally indicated that I had to leave the conversation briefly.

This indicates that platforms should explore lightweight ways for users to let each other know when they need to take a pause. Our users liked the idea of indicating on a certain message that they needed to pause and step away, while similarly worrying that the timer could complicate this need. Removing this timer removed this concern during our system pilot. Current platforms could incorporate design interventions similar to ours, and some already have. For instance, Discord's "slow mode" [Lo, 2018] limits the amount of messages a user is able to send in a channel based on a timer after each message. Our users also indicated that the individual message is not necessarily in a 1:1 relationship with the action a user needs to take, for instance, many stream-of-consciousness messages could all be related to one topic that a user needs to take a break from. While we were unable to incorporate this feedback for our pilot, this could be a beneficial

next step for a pausing intervention. However, in the absence of these formal supports, users talked about how even stating "I need to take a break" would be enough for them to feel reassured of the importance of the conversation to the other person.

5.5 Conclusion

The goal of this research was to explore the ways in which design can support people in navigating conflict effectively, drawing from human-centered design to humanize and replicate what people already do offline. We used these findings to develop two design interventions for tone tagging and pausing messages, and used these to probe further reflections on how design can support people during conflict via reflections on high-fidelity prototypes and a web application. We find that people are enthusiastic for design interventions that offered text-based communication for what often go unspoken - how one is feeling, and whether they need to take a break. These findings highlight that people find value from design frictions when engaged in hard conversations online, and they allow users to remain in deeper connection with one another by allowing for specific, organized communication as well as the communication of emotional context. In the absence of formal design support, we encourage users to make use of tone indicators as used on platforms such as Twitter, and to share explicitly when one needs to step away from a conversation.

Part II

Attunement To Self

Chapter 6

Normative Dissociation on Social Media

Often, people report losing track of time on social media. They describe their experiences as mindless, depleting, and preventing them from doing what they would prefer to spend time on. I have investigated these experiences through the lens of *normative dissociation*: total cognitive absorption, characterized by diminished self-awareness and reduced sense of agency. Chronic dissociation prevents self-attunement, as self-states are unable to communicate and integrate information. Therefore, I decided to explore user experiences of normative dissociation on social media to understand how design may disrupt and reduce normative dissociation and therefore increase self-attunement. I, along with my colleagues [Baughan et al., 2022], designed and deployed a custom Twitter client, called Chirp to 43 U.S. participants. We completed interviews and used experience sampling, which revealed that sometimes, becoming absorbed in normative dissociation on social media can be a beneficial break. However, people also passively slip into normative dissociation, which they say leaves them feeling as though they wasted their time. Most often, users lamented spending too much time online, how it was difficult to assess the passage of time, and how they would have preferred to spend their time differently, indicating a lack of self-attunement to competing desires while scrolling.

Design interventions such as custom lists and reading history labels reduced normative dissociation by fundamentally changing how users interacted with content on their mobile app. However, time limit pop-up dialogs only disrupted dissociation when users chose to use them to exit the application. Otherwise, they had no effect. And usage statistics pages were only effective when people decided to make use of them; their presence alone did not have an impact on normative dissociation.

Our findings demonstrate that interaction designs intended to capture attention likely do so by harnessing people's natural inclination to seek normative dissociation experiences. Often, people lament that they would have preferred to spend their time differently if they had been more aware of how much time had passed online. These experiences of dissociation prevent social media users from experiencing self-attunement while scrolling, often resulting in these dissatisfying and disorienting social media experiences.

6.1 Background and Motivation

An increasing body of research has shown that experiences of normative dissociation are more common than previously thought [Butler, 2006, 2004; Butler and Palesh, 2004]. Butler [2004, 2006] identifies two ways in which people enter normative dissociation, which we describe in Fig. 6.1. People *passively enter dissociation* when they spontaneously slip into an unplanned experience, such as daydreaming. This is often described as "spacing out" and can be secondary to another activity that is low in cognitive demand, for instance, driving on a highway (i.e., highway hypnosis), taking a shower, or playing a simple computer game. The resulting experience involves absorption in an internal world, along with a loss of self-awareness and awareness of the passage of time. These moments are a common and beneficial part of everyday life, and engaging in simple activities that allow for daydreaming (i.e., normative dissociation) can promote creativity and problem solving [Baird et al., 2012]. Daydreaming also allows for "dishabituation" which enhances learning by providing short breaks from tasks [Schooler et al., 2011].

In contrast, when people *actively enter normative dissociation*, they intentionally seek an escape in an absorbing activity that pushes the concerns of daily life to the periphery of awareness. Many people "actively" dissociate by listening to music, watching movies, or reading [Becker-Blease, 2004; Butler and Palesh, 2004; Goldsmith and Satterlee, 2004]. This may serve an adaptive function, as becoming absorbed in a recreational activity can reduce stress and improve mood [Butler, 2004, 2006; Ludwig, 1983; Singer and Pope, 1981]. It is possible that people encounter both forms of dissociation through their social media use: People may use social media to actively enter a dissociative state or passively slip into a dissociative state while scrolling.

A third and rarer experience according to Butler [Butler, 2004, 2006] is *positive dissociation*. These experiences involve intense absorption with activities of personal significance. Flow states [Nakamura and

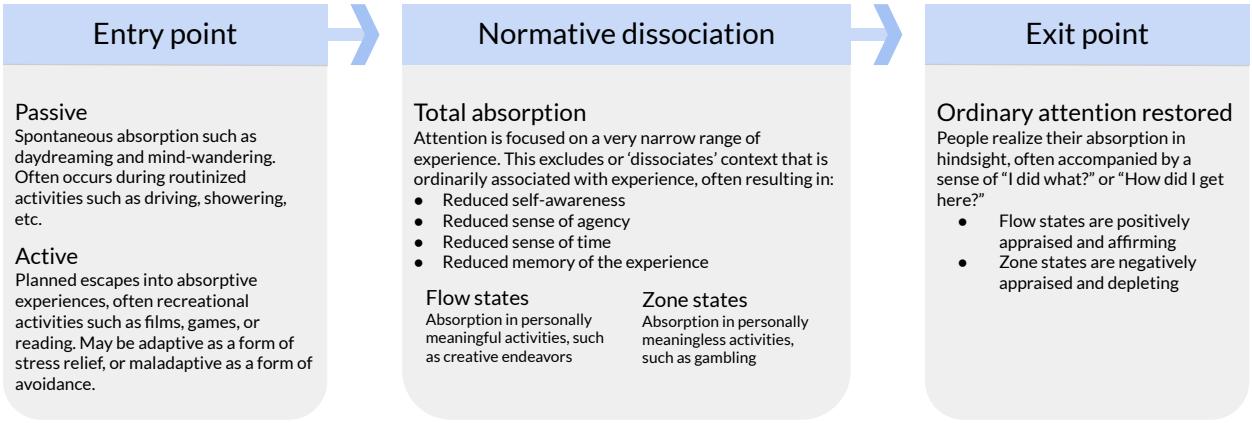


Figure 6.1: Normative dissociation can be understood as a process [Butler, 2011]. It can begin either as an active choice or passively, through spontaneous absorption. Once totally absorbed, the individual's attention is focused on a very narrow range of experience. It is typically only once ordinary attention is restored that people realize they have dissociated.

Csikszentmihalyi, 2014; Butler, 2004] are an example, as an individual is challenged just up to the limit of their abilities and must be totally absorbed to realize peak performance [Nakamura and Csikszentmihalyi, 2014]. Digital game designers have found flow theory to be a helpful guide to creating immersive experiences that provide pleasure and happiness [Calleja, 2007; Chen, 2007; Cowley et al., 2008].

Yet, dissociation is not always a positive and self-actualizing experience. For example, Schüll [2012] cautions that Las Vegas gambling devices are designed to draw people into "the machine zone," a state that gamblers experience as nearly identical to a flow state, except that in the end they feel depleted instead of affirmed. Journalist Alexis Madrigal extends this to "The Facebook Zone," describing the feeling of being hypnotized and regretting lost time in its aftermath [Madrigal, 2013]. Rather than conceptualizing "flow" and "the zone" as two separate experiences, it is useful to recognize that they are *both* forms of normative dissociation. The crucial difference and question is how the interaction between the user and design results in a feeling of positive affective valence and intrinsic value in the case of "flow" and a negative valence with little to no intrinsic value in the case of "zone" experiences.

Fortunately, design can play a role in helping people reduce their ritualistic and meaningless technology use and "zone" experiences [Lukoff et al., 2021; Lyngs et al., 2019, 2020]. For example, designs can discourage overuse by adding micro-frictions on top of an existing design [Cox et al., 2016], e.g., nudges [Purohit et al., 2020; Okeke et al., 2018] or lockout mechanisms [Kim et al., 2019a,b]. Popular screen time tools,

like Apple's Screen Time on iOS and Google's Digital Wellbeing on Android, apply these approaches to all apps on their platforms. Prior work labels these standalone tools *external supports* [Lukoff et al., 2021]. In contrast, another promising approach to reduce meaningless technology use is to provide *internal supports* [Lukoff et al., 2021] to prevent the features within an app from inhibiting awareness and reflection in the first place. Design researchers have explored removing the newsfeed from Facebook [Lyngs et al., 2020], removing autoplay [Lukoff et al., 2021], and helping users plan out their content consumption in advance [Hiniker et al., 2018]. These design interventions have found success in increasing users' sense of control and satisfaction when using social media. Here we ask how social media design might also influence the experience of normative dissociation.

6.2 Designing and Deploying Chirp

To evaluate if people dissociate while using social media and how design decisions might systematically affect normative dissociation, we developed four versions of a custom Twitter client, which we called Chirp[1], based on the open-source project *Twidere*[2]. Below, we describe our deployment, including the experience sampling and interview data which informed our findings.

6.2.1 Creating Chirp

Users signed in to their Twitter accounts through Chirp, allowing them to interact with their usual content, as shown in Fig. 6.2. Twidere displayed tweets in chronological order. Our goal with redesigning Twitter was to increase user agency while interacting with their regular content. To inform our designs, we 1) surveyed Twitter users, 2) conducted interviews and a sketching activity with a panel of four expert designers, and 3) completed a design analysis of Twitter alternatives. Through these user-centered design processes, we developed four design interventions to increase users' sense of agency. These comprised of two "internal" interventions and two "external" interventions. The internal interventions changed how users interacted with content on Chirp, whereas the external interventions provided additional tools for self-monitoring screen time and usage. We created four versions of Chirp, in which 1) only internal interventions were enabled, 2)

[1] https://github.com/uelab/Chirp
[2] https://github.com/TwidereProject/Twidere-Android

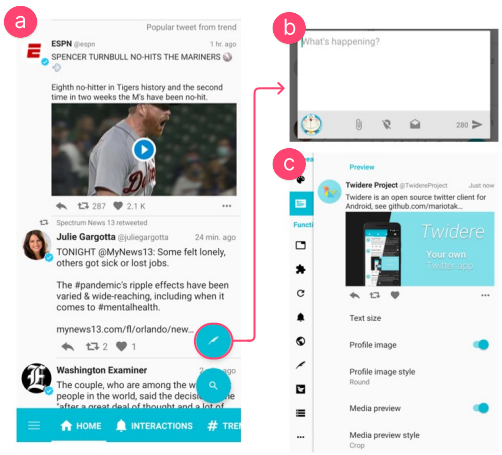


Figure 6.2: Interfaces of Chirp: a) the home page, which shows tweets from all accounts followed. Tweets are displayed in chronological order; b) interface for composing a tweet; c) settings page, where the user can configure the user interface and other options provided by Twidere.

only external interventions were enabled, 3) no interventions were enabled (control), and 4) all interventions were enabled.

Internal Interventions

When internal interventions were enabled, *reading history labels* informed users when they had read all the most recent tweets (see Fig. 6.3a). Rather than interacting with tweets in one main feed, users also had to sort their content into *lists* of accounts they followed (Fig. 6.3b,c). This created multiple, separate, user-organized feeds. We also removed popular tweets (which were present in the baseline version) and enabled users to filter out retweets and replies.

External Interventions

When external interventions were enabled, users could interact with a *usage stats page*. This page contained information such as time spent on Chirp, number of tweets consumed, and other usage information (Fig. 6.3d). Users could opt to view this page at any time, but they were not required to use it. Separately, a *time limit dialog* appeared every 20 minutes to display the cumulative time spent during their current session (Fig. 6.3e). This dialog asked if users would like to continue using Chirp and dismiss the dialog, or exit

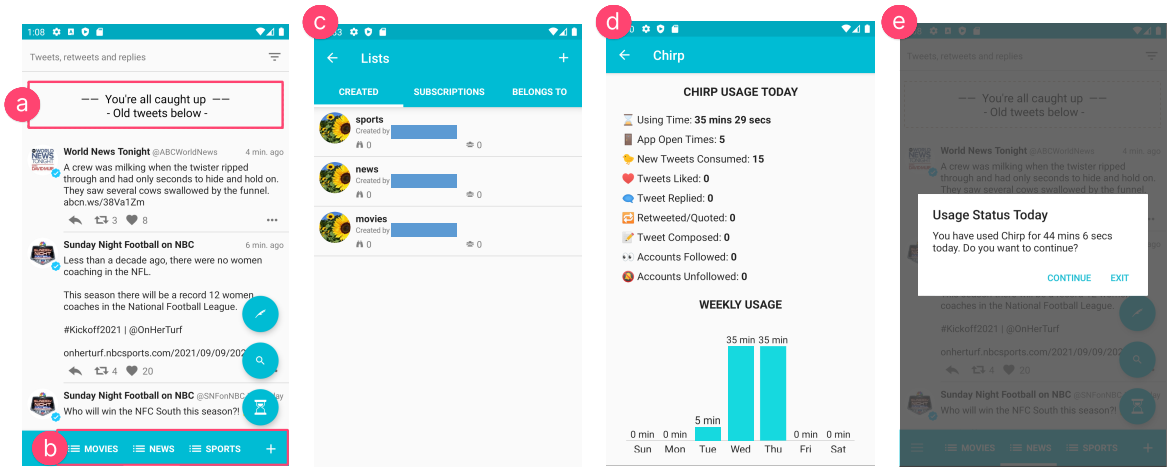


Figure 6.3: Implementation of the design interventions to reduce or disrupt normative dissociation. Internal interventions included (a) reading history labels and (b, c) custom lists. External interventions included (d) usage statistics and (e) a time limit dialog.

Chirp.

6.2.2 Procedure

Eligible participants received an Android apk file via email to install Chirp on their Android smartphone. The study lasted four weeks, in which each participant used one of the four versions of Chirp for one week. We used Latin-square counterbalancing to determine the order in which participants received each version of Chirp's designs. At the beginning of each week, participants received a tutorial via email, which included both video and pdf, detailing the features included in that week's version of Chirp and encouraging participants to use the features. We additionally required that participants uploaded a screenshot of each feature at the start of each week to ensure they could successfully use them.

Once the deployment was completed, we interviewed 11 participants via Zoom. We asked users about their experiences using Chirp, and in particular, we asked about mindless scrolling and usage in alignment with normative dissociation, such as not paying attention to surroundings. If present, we asked about whether these experiences of normative dissociation occurred on other social media sites and how it impacted their relationship with social media. Finally, we asked about specific design features that influenced normative dissociation. Interviews were approximately 30 minutes long.

6.2.3 Participants

We recruited English-speaking adults from the U.S. via email, online forums, and Mechanical Turk. Participants were required to own and Android smartphone with the Twitter app installed, spend at least 10 minutes per day on Twitter, and spend 10% or more of their time on Twitter from a smartphone. Participants from Mechanical Turk were additionally required to have a task approval rating greater than 99%, with over 1000 approved tasks. In recruitment emails and advertising, we stated, "We are interested in features that lead people to spend their time in ways that align with their personal goals," or "We want to study how different features affect your experience and sense of control when using Twitter."

43 participants finished the month-long deployment, out of an initial 51 who enrolled. 19 women, 23 men, and 1 non-binary person enrolled in the study. 39 were recruited from Mechanical Turk, and 4 were recruited from an email list. The average age was 33.7 ($sd = 9.4$, $min = 18$, $max = 63$). Most of the participants ($n = 26$) used Twitter for 5-60 minutes per day, 10 used Twitter for 1-2 hours per day, and seven for more than 2 hours per day. Participants received a total of $120 for participating in the full study, with those 11 participants who we interviewed receiving an additional $14 Amazon gift card. The 11 participants were chosen because they used Chirp more than three days per week during the deployment.

6.2.4 Analysis

Metrics

During the study, we recorded users' behavior by collecting logs of time spent on Chirp at two levels of granularity: daily totals and individual instances. Number of app opens, number of times the Chirp usage statistics page was viewed, and number of times the time limit dialog was ignored or used to exit Chirp were collected as daily totals. We recorded 476 daily logs of user activity. We recorded time spent viewing the various feeds (home or lists) and time spent viewing feeds after the user has crossed into their history of previously read tweets individually per session. We collected 8880 logs of this activity.

Additionally, during deployment, we collected responses to notification questionnaires based on the experience sampling method (ESM) [Csikszentmihalyi and Larson, 2014] to collect *in situ* feedback from the users. ESM questions were first displayed to users after three minutes of using Chirp, and then repeatedly shown every 15 minutes. Several of the questions in the ESM were analyzed in a separate study [Zhang

et al., 2022]. Of relevance to this investigation was the statement, "I am currently using Chirp without really paying attention to what I am doing." Participants could respond on a Likert scale of 1 (Strongly Disagree) through 5 (Strongly Agree). This question was adapted from the Dissociative Processes Scale (DPS) [Harrison and Watson, 1992], which states, "I often seem to do things without really paying attention to what I am doing" and allows people to respond on the same scale. The DPS is distinct from other instruments for measuring dissociation in that it is designed to assess common, everyday dissociative tendencies. It consists of three subscales: obliviousness (automaticity and mindlessness), detachment (depersonalization and derealization), and imagination (absorption and fantasy). Our question is from the "obliviousness" subscale. If the participant submitted multiple ESM responses per day, the average daily score was recorded

ESM and Logs Analysis

We conducted two series of analyses to determine how user behavior on Chirp correlated with the ESM question on normative dissociation. First, we took the dataset of 8,880 logs of reading activity and the dataset of 476 aggregated daily logs of time spent on Chirp and clicks on various features and joined the rows of data with the daily average score (from 1 (strongly disagree) to 5 (strongly agree)) in response to the ESM question: "I am currently using Chirp without really paying attention to what I am doing." We then evaluated Gaussian (linear) and inverse Gaussian models for fit, using the Tisane [Jun et al., 2021] tool as a guide, as well as a Shapiro-Wilk test on the residuals of the model. In all cases, the inverse Gaussian mixed model had the best fit based on the analysis of the residuals, so we report on these models' results. The dataset and R analysis notebook are available on GitHub.[3] In the quantitative results discussed below, "normative dissociation" refers to participants' responses to the ESM question.

Interview Analysis

To analyze the interview data, we began with open coding of responses, during which two authors coded and memo-ed any items related to dissociative experiences on social media. We then met to discuss, compare, and refine codes. Next, we met with a third researcher whose area of expertise is in normative dissociation, who helped further refine our codes. We then agreed on a closed coding structure, with which we re-coded

[3] https://www.github.com/uelab/normative-dissociation

the same set of interview data. We focused on recurring themes using grounded theory analysis [Olson and Kellogg, 2014]. We determined that participants who described mindless scrolling or becoming completely absorbed in social media use, coupled by a loss of sense of time or self-awareness, were experiencing normative dissociation. In the discussion that follows, "normative dissociation" is operationalized through this lens for the qualitative results. Quotes below have been edited for readability by removing filler words (ums, uhs, you know, like), false starts, and self-corrections.

6.3 Results

We found that users did experience normative dissociation while using Chirp, and that design did influence the extent to which participants experienced normative dissociation.

6.3.1 Experiencing Normative Dissociation while Using Social Media

Seven of the 11 interviewees described experiencing normative dissociation when using social media. Eighteen of the 43 deployment participants responded at least once to an ESM prompt by agreeing or strongly agreeing with the statement that they were using Chirp without paying attention to what they were doing, for a total of 58 instances of normative dissociation. Participants said they regularly had moments where they "*lost track of time*" (P30), became "*all-consumed*" (P28), and stopped paying attention to the world around them. These included instances in which they actively sought out dissociative experiences and instances in which they passively slipped into them.

Sometimes, our participants found themselves using Chirp on autopilot, while their minds were absorbed in thoughts unrelated to their actions, a form of passive dissociation. One participant said, "*Well, you know when you do that thing where you're driving, and you forget you're driving and then you snap back? But you're still on the road, you know? It's like that kind of thing, where you don't realize you're doing something*" (P33). They continued, saying, "*I'm on here reading Twitter, and I don't even remember what I read.*"

Many participants described getting "lost" in the experience or losing track of time. In these instances, participants described their use of social media as wholly absorbing, such as when P28 said, "*I [was] all-consumed in what I was looking for…[and] just forgot about everything else*." Many participants had

similar experiences, such as P29, who said "*I lost track of time and what was going on around me*." Others also described how they disconnected from their surroundings, saying, "*It's like you get tunnel vision on it. You just block out your surroundings while you're using it. Then I guess I come back, and I realize I was on it for two hours or something*" (P30).

They also described how this affects their relationships with others, with one participant saying their partner would become frustrated because "*sometimes I'll be like, 'Oh sorry, I wasn't listening to you. I was tweeting'*" (P35). These experiences reflect normative dissociation: users become so entranced in either the content of the site, or their own thoughts while scrolling on auto-pilot, that their self-reflection and self-awareness is suspended.

6.3.2 Design Influences Normative Dissociation on Social Media

Our qualitative and quantitative data provided evidence that the different designs we tested were effective in reducing normative dissociation: custom lists, reading history label, time limit dialogs, and usages statistics.

Internal Interventions: Custom Lists Reduce Normative Dissociation

Many users said that the lists and reading history label helped them to reduce their mindless consumption of Chirp. For instance, P16 contrasted scrolling on custom lists and home feeds, saying, "*There probably was [a time I was mindlessly scrolling] when I was looking at the main thread, definitely not when I was looking at lists.*" They continued, saying "*I really like the idea of looking at lists... I want to look at this topic that someone worked hard to curate.*" Similarly, P43 said, "*With Chirp, I felt like I had a lot of control because I was able to list the things that I wanted to see and get rid of the garbage I didn't want to see.*"

These users' reflections were also supported by statistical analysis. When lists and reading history labels were present, we collected 236 ESM scores from participants ($mean = 1.71, sd = 1.19$) and 4,364 logs

Table 6.1: An inverse Gaussian mixed model demonstrated a negative correlation between normative dissociation, measured as whether they were using Chirp without paying attention to what they were doing, and using custom lists.

	β	std. err.	t	p
(Intercept)	0.566	0.117	4.857	<0.001
Lists (categorical)	**-0.027**	**0.006**	**-4.763**	**<0.001**
Time spent reading (hours)	-0.053	0.082	-0.642	0.521

of reading behavior. We ran an inverse Gaussian mixed model to evaluate the impact of custom lists on normative dissociation, which was measured as the response to the ESM question, "*I am currently using Chirp without really paying attention to what I am doing.*" We used the following as independent fixed variables: 1) a categorical variable of whether they were reading from custom lists or their home feed and 2) time spent reading a feed. Participant ID and date were added as random effects. 8880 logs of reading activity were used in this model. As shown in Table 6.1, lists significantly reduced normative dissociation compared to home feeds ($\beta = -.027, t = -4.763, p =< .001$).

P16 also discussed how both lists and the reading history label together created an environment that safeguarded their time and attention:

> "*The list plus the 'you're all caught up now'...felt safer compared to some other social media, because...My mental model is like the 'down the rabbit hole of I can never be done with consuming a social media app by design.' So it's like I go there realizing I will need to exert some self regulation to put it down. Whereas with the list [and reading history label]...I go there with some knowledge that there will be a stop...I know that there will only be couple minutes worth of tweets in this list, or maybe if I want to go crazy, go look at a second list. But at the end of the day, I'm all caught up now, that's it...The stop criteria is built into the list.*"

Internal Interventions: Reading History Labels May Reduce Normative Dissociation

When asked if there were any design features in Chirp that helped them realize when they were not spending time on the app in the way that they wanted, P3 said, "*The reading history label helped me stop going through and scrolling to a point where I get into that mindless state. It put a barrier there to say, 'this is all that there is for today, maybe it's time to log off' as sort of a personal hint.*" Similarly, P33 said, "*I think it's the most useful thing I found using Chirp, just that...it put into focus how much you just open up something like this, or I mean like Facebook or whatever, and just scroll and scroll just out of boredom...It broke out of the 'zombieness,' of using social media.*"

To quantify the effects of reading history labels on normative dissociation, we ran another inverse Gaussian mixed model on the 8880 logs of reading activity. This model used: 1) a categorical variable of whether reading history labels would be shown due to internal interventions being activated, 2) a categorical variable

of whether participants scrolled into their history of previously read tweets, and 3) the interaction of these variables. Participant ID and date were added as random effects. Our model showed that the interaction of the reading history label and scrolling into previously read tweets had a significant effect on normative dissociation ($\beta = -0.046, t = -4.158, p < .001$), as shown in Table 6.2. Pairwise comparisons using Z-tests, corrected with Holm's sequential Bonferroni procedure, [Holm, 1979] shown in Table 6.3, showed that people reported less normative dissociation when scrolling into previously read tweets if the reading history label is shown, compared to not shown ($Z = 4.413, p < .0001$). People also report less normative dissociation when they scroll through tweets and then see the reading history label, compared to when they do not scroll for long enough to view it ($Z = 3.791, p < .001$). This supports the idea that regardless of circumstances, people dissociated less when they viewed the reading history label. However, because the ESM scores were aggregated daily measures, and we do not know when the ESM score was collected relative to seeing the reading history label, it is difficult to determine the causality.

Table 6.2: Inverse Gaussian mixed model demonstrating the relationships between users scrolling into their history of previously read tweets, the reading history label being shown, and reported daily average scores for normative dissociation. There was a positive correlation between normative dissociation and scrolling into previously read tweets. We did additional *post hoc* analysis to understand the relationship between normative dissociation and the interaction effect.

	β	std. err.	t	p
(Intercept)	0.548	0.117	4.692	<.0001
Reading History Label Shown	0.002	0.005	0.376	0.707
Scrolled Into History	**0.021**	**0.009**	**2.381**	**0.017**
Reading History Label				
***Scrolled Into History**	**-0.046**	**0.011**	**-4.158**	**<0.001**

Table 6.3: Post hoc pairwise comparisons using Z-tests of the interaction between showing a reading history label and scrolling into previously read tweets demonstrate that reading history labels may disrupt and lower normative dissociation for our participants.

Reading History Label	**Scrolled Into History**	**Estimate**	std. err.	Z	p
Shown vs. Not Shown	**Yes**	**0.044**	**0.01**	**4.413**	**<0.001**
Shown	**Yes vs. No**	**0.024**	**0.006**	**3.791**	**<0.001**
Not Shown	Yes vs No	0.021	0.009	2.381	0.052
Shown vs. Not Shown	No	0.002	0.005	0.376	0.706

External Interventions: Time Limit Dialogs and Usage Statistics Can Disrupt and Reduce Dissociation

Other users reported that external interventions were very helpful in managing their normative dissociation while using Chirp. Across the entire study, 13 participants used the time limit dialog to exit Chirp a total of 28 times over the two weeks that this feature was available. Six of those 28 times, users exited Chirp as soon as they saw the dialog the first time. In all other cases, the users ignored the dialog at least once, and as many as nine times before using it to exit Chirp. Of the participants we interviewed, only one (P30) used the time limit dialog to exit Chirp on two separate occasions, after ignoring the dialog 3 or 4 times beforehand. In their case, it was tied to their goals, and they said "*I would ignore [the dialog] and keep using [Chirp]. Sometimes it was annoying. But there were a few times when that popped up and said I had used the app for an hour that day. At that point I just decided to close out. It didn't always make me close out, but definitely a handful of times I realized I had used the app for a long time that day. I set a goal for myself to try not to go over an hour every day.*" P30 further explained that, "*The timeout feature sometimes would pop up and . . . if I did have that zoning out feeling, it would just kind of pull me back and remind me I can close it out.*"

This theme was also reflected in our statistical analysis. We constructed an inverse Gaussian mixed model in which the independent fixed variables were: 1) clicks to exit Chirp via the time limit dialog, 2) clicks to ignore the dialog, and 3) clicks to view the usage statistics. We also added total time spent using Chirp as an independent fixed variable. Participant ID and date were added as random effects in the model. The 476 aggregated daily logs of user behavior and ESM scores were used for this model, of which 249 were collected when external interventions were activated ($mean = 1.45, sd = 0.84$). As shown in Table 6.4, users who exited Chirp via the time limit dialog reported higher levels of normative dissociation before doing so ($\beta = 0.172, t = 2.616, p = 0.009$). It appears that the time limit dialog allowed them to realize

Table 6.4: The inverse Gaussian mixed model demonstrated that there was a positive correlation between people agreeing that they had been using the app without paying attention to what they were doing (normative dissociation) and using the time limit dialog to exit Chirp, and a negative correlation with usage statistics views and normative dissociation.

	β	std. err.	t	p
(Intercept)	0.618	0.121	5.090	<0.001
Consume Time (Hrs)	-0.014	0.079	-0.172	0.863
Exit via Time Limit Dialog	**0.172**	**0.066**	**2.616**	**0.009**
Ignore Time Limit Dialog	0.019	0.010	1.855	0.063
View Usage Statistics	**-0.016**	**0.005**	**-2.898**	**0.004**

their normative dissociation and take action to stop scrolling.

Other users also liked the time limit dialog, but wanted more control over the time intervals than Chirp provided. P31 said,

> "*One of the features that you proposed was the alarm... so if Chirp could understand [my] patterns [of using Chirp], and kind of smartly alert me of, 'You're following a different pattern than I'm expecting,' and asking me, 'Are you okay with doing what you are doing for this amount of time right now? If you are okay, go on my friend, but if you're not, it's a good time to stop.'* "

This user felt that automatic detection of deviating from their normal pattern of use could help them gain control over how they used social media. However, some users simply found the time limit dialog annoying; as P33 said, "*It was just another thing I had to click to get it out of my way. On the internet, there so many popup things, like cookies, you have to just click on, to get out of your way. Just it was another one of those. I probably didn't really consciously pay that much attention to it.*"

Some users liked the usage statistics page and how it allowed them to track their time spent. P3 said, "*That bar graph is what spurred sort of that desired change of, I don't want Twitter to just be a habitual open scroll and then call it a day, I want to only be on there when there's a reason to be.*" P30 said, "*Definitely the usage stats page, because that let me see all the information about how many tweets I had consumed... and of course the usage time... I think that was the most important part, because I would check that.*" Our model also revealed a significant negative correlation between number of views of the usage statistics page and normative dissociation ($\beta = -0.016, t = -2.898, p = .004$). This demonstrates that surfacing this feature to users may lead them to dissociate less on social media, if they decide to use it.

Finally, some users wanted all features present and felt like that was most effective. P13 said, "*I feel like all the features, as long as they are there, then it's kind of how I want it to be... like every time something was taken away, I felt myself missing that you know because they work so well together with everything else.*"

6.4 Discussion

This research demonstrates that many people dissociate while using social media, whether that means becoming fully absorbed by the content they are consuming, or mindlessly scrolling while absorbed in a different line of thought. Recognizing these experiences as instances of normative dissociation enables us to better understand the cognitive processes that are engaged when users browse social media and to design to help increase self-attunement during and after these experiences.

6.4.1 Normative Dissociation as an Alternative to the Internet Addiction Narrative

Social media overuse appears to sit in a paradoxical position: a large body of prior work operationalizes and models technology addiction [Andreassen et al., 2012; Lin et al., 2014; Kwon et al., 2013; Oulasvirta et al., 2011; Young, 2016], while other work cautions against pathologizing everyday behaviors and pushes back on the addiction narrative [Lanette et al., 2018]. And while scholars question whether an "addiction" framing is appropriate for this context [Lanette et al., 2018], products openly leverage techniques to engage and keep users' attention [Kobayashi and Hsu, 2019; Eyal, 2014]. This has led to an environment in which many people, including our participants, feel shame around their social media use.

Recognizing absorbed and distracted social media use as instances of normative dissociation offers an alternate framing from the addiction narrative. Seeking escape from the present moment through deep absorption—including absorption in social media—is a natural, common, and often beneficial cognitive process. Instances of normative dissociation have the capacity to provide a restful break and a forum for mental processing [Butler, 2004, 2006]. However, once in a dissociative state, people cannot simply "self-control" their way out of social media scrolling. Becoming deeply absorbed to the point of normative dissociation *by definition* means that an individual will have a diminished capacity for self-awareness and sense of volition—the very tools they need to stop their use.

Thus, social media companies cannot assume that users will come and go freely: users will not always have the ability to leave of their own free will. In fact, it may be this tension between becoming "lost" in scrolling social media and engaging self-control that leads to so much dissatisfaction with social media use. Users are given an impossible choice: they can either lean in to the experience of browsing social media and reap the benefits of normative dissociation or they can resist and maintain their self-awareness. The former

leads to a frustrating time sink, as the design of the platform encourages extended normative dissociation that prevents the user from returning to the present moment. Meanwhile, the latter requires additional mental energy and robs users of the benefits they would accrue from mind-wandering and absorption. This suggests that it is possible for users to have healthy and satisfying relationships with social media, even while dissociating, if the platforms providing intentionally absorbing experiences also provide a pathway to disengagement.

6.4.2 Designs that Disrupt Normative Dissociation

Design practices that are common in current social media platforms led to more normative dissociation for our participants. Specifically, infinite feeds that defaulted to show all content together led users to feel more dissociated and less in control of their scrolling than when content was segmented into custom lists that informed them when they had exhausted all new content. And our data also suggests that time limit dialogs and usage statistics pages are effective tools for minimizing and disrupting normative dissociation if users choose to use them. All of these designs have parallels that users can begin to take advantage of, depending on the platform. Below, I outline concrete steps platforms can take to build trustworthy experiences that allow users to reap the benefits of normative dissociation while meeting their holistic goals for time management.

Cater to Users' Narrowed Attention: Default to Small Portion Sizes and Curated Experiences

Our users liked that custom lists gave them a smaller amount of content to consume. As one user said "*I know there will only be a couple minutes worth of tweets in this list, or maybe if I want to go crazy, go look at a second list*." Users knew that they could have a sense of being caught up with new content in a matter of minutes rather than having to continuously scroll to find what they were looking for. This demonstrates that users appreciate having content served in manageable portion sizes [Tran et al., 2019] that allow them to disengage quickly and easily. Similarly, users said that looking at a list that "*someone worked hard to curate*" was ideal. Lists are already a feature of Twitter [Twi], however, most of our participants either were not aware of it or had never used it. This demonstrates that adding this feature as an option is not enough: platforms need to default to categorized, curated experiences for users to reap the benefits.

Re-engage Self-Awareness: Add Meta-Commentary to the Feed

People discussed how reading history labels alleviated their inner conflict between their desire to consume content and need to self-regulate to stop their use. As one user said, "*the stop criteria is built into the list*." This directly contradicts much of the current state of social media which encourages users to scroll for as long as possible [Eyal, 2014]. In scenarios where a user may never "catch up" on all content (or where doing so might be undesirable), we suggest displaying a line in their feed that says, "You've been scrolling for [X] minutes." Based on past work, notifying users in their feed every 15, 20, or 30 minutes of use may allow them to re-engage their self awareness, without the "ick factor" [Tran et al., 2019] of having spent too much time online. TikTok has already incorporated a similar feature, in which users see a video in their feed encouraging them to take a break after an hour of scrolling [Stokel-Walker, 2020]. Reading history labels have already been adopted by Instagram too [all, 2018], but otherwise this style of intervention remains largely absent from social media platforms. Both of these design concepts (a reading history label and passive broadcasts about scrolling) are a natural fit for re-engaging self-awareness, as they offer commentary on the current interaction and invite the user to reflect on it.

Encourage Self-Reflection: Allow for In-App Self-Tracking

Allowing people to easily self-track with time limit dialogs containing cumulative daily time on site allowed people to disrupt their normative dissociation. However, this feature received mixed feedback, and even participants who used the time limit dialog to exit Chirp said things like, "*sometimes it was annoying*." Some users suggested ways to make this feature more effective, for instance, by allowing users to set the time intervals, or having the platform automatically predict when they were using the platform for longer than than they usually do. And still others said it was just another thing to "*get out of your way.*" This shows that while time limits can make users aware of their normative dissociation, they can also intrude and disrupt the experience. There is an opportunity for further research to investigate how to make time limits an effective design friction [Cox et al., 2016]. Similarly, the number of times participants viewed usage statistics was positively correlated with the extent to which participants dissociated. This suggests that giving users an easy way to monitor and track their use of a social media platform will lead to less normative dissociation during social media use. These features are already present on some social media such as TikTok and

Instagram [Mosseri, 2021; TikTokUK, 2019], and users can also take advantage of existing external tools such as Apple's Screen Time on iOS and Google's Digital Wellbeing on Android [Support, 2021; Help].

Augment Self-Regulation: Remind Users about Their Next Activity

While it was not an aspect of our study, encouraging users to plan their use and their next activity afterwards may be effective for allowing users to dissociate safely during social media use. Hiniker et al. [2018] found that pre-planning an activity to transition to after watching online videos was one of children's favorite parts of their use. Planning and purposeful decision-making can increase people's ability to self-regulate their behavior [Schweinhart and Weikart, 1997], and serving reminders in-app of their next activity after a user-determined amount of time would likely help people break out of normative dissociation and self-regulate.

Users Empowering Users: Supporting Community Disengagement

Even without support from social media companies through the examples above, users can disrupt normative dissociation for each other. To some extent, this already occurs online. As discussion of "doomscrolling" has increased [Watercutter, 2020], some online accounts have encouraged users to "stop scrolling," "log off," and "rest" [Ministry, 2021; Ho]. These user-driven interventions alert others to potential dissociative and mindless scrolling, and encourage re-engaging self-awareness, much like a time limit dialog or reading history label might alert users to how much time they have spent on social media in a session. Future work could consider sociotechnical interventions that include how other users—rather than design interventions alone—can disrupt normative dissociation online.

Limitations and Future Work

While we are confident in our findings, there are several limitations to note and ways future work could build on our results. First, our investigation did not evaluate how content influences normative dissociation online. Certain types of content may trigger different engagement and normative dissociation patterns, which could be explored in future work. Similarly, we only studied normative dissociation on Twitter, which is generally a public-facing, text-based social media platform. Effective design interventions may vary based on the type of platform, and future work could investigate experiences of normative dissociation and designs to disrupt

it on other platforms.

Additionally, our quantitative investigation modeled daily average ESM scores, rather than per session, which limits the granularity with which we could explore our data. We also were continuously prompting users to consider how they were using Chirp throughout the four-week study, which may have influenced how they used it. Similarly, we specifically asked participants if they could recall moments of mindless scrolling, although we did not mention dissociation, define it, or prime them with examples at any point during the study. Asking explicitly about experiences of mindless scrolling was necessary to answer the research questions in our study, but our results should be interpreted in light of the fact that we raised the topic explicitly.

Finally, our ESM initially appeared to users after only three minutes of active use. This may have caused a sampling bias towards fewer moments of normative dissociation. Future work may benefit from a longer timeline before displaying the ESM and incorporating questions from each of the three subscales of dissociation in the DPS.

6.5 Conclusion

We find that people describe their social media use in ways that fit the normative dissociation model: people named experiences of both becoming deeply absorbed in their content consumption and mindlessly scrolling on autopilot, while their mind was absorbed in other thoughts. These instances of normative dissociation online are accompanied by a decreased sense of volition, which can be harnessed through current designs to maximize user time spent on site. This means that social media platforms cannot assume they are neutral artifacts from which people will come and go freely; there are instances in which users' volition is not accessible to them, which may prevent them from disengaging. However, design can reduce and disrupt normative dissociation; we provide example features that are effective in doing so, including custom lists, a reading history label, time limit dialogs, and usage statistics. This indicates that designing for positive disengagement experiences can maximize the benefits of normative dissociation on social media and prompt self-awareness. With the lens of normative dissociation, we bring greater precision to understanding habitual social media use and how to design for more self-attuned online user experiences.

Chapter 7

Reflections on Designing for Attunement

My work shows that while current approaches to design in social and communication platforms often do not meet users' needs for attunement to themselves and others, design can also nudge them towards behaviors that deepen their attunement. My work also shows that users *want* to have more attuned experiences online, whether to themselves or others, and they are excited about ways that digital design could support them in meeting these goals.

7.1 Increasing Attunement Online

7.1.1 Conflict and Attuning to Others

In each of our studies to understand hard conversations online [Baughan et al., 2021], participants talked about how important it was to know *how* something was meant, and nonverbal cues such as tone, facial expression, and other gestures were lost in text-based online communication. Attuned communication is *responsive* and *specific* to the issue, context, and relationship [Siegel, 2007]. One option that many platforms already offer to help participants easily switch to richer channels is to voice and video calls. Some of our participants discussed how they incorporate these features into their conflicts, and how they liked to follow online conflicts with an in-person check-in. These richer channels facilitate greater attunement through access to tone of voice and facial expression.

To help facilitate higher attunement between people online through text-based channels, the online

neurodivergent community has created tone indicators [Christanti et al., 2022; Marcus, 2020; @ranlaugh], which we used in the development of Daffodil. These tone indicators can be seen across Twitter, Reddit, and even YouTube, and they especially help with detecting serious tone from joking or sarcasm. This demonstrates how people are innovating to meet their needs for higher attunement and context during text-based communication.

Participants also explained that they made intentional choices to engage in conflict over computer-mediated communication. They explained how asychronicity allowed for a slower pace, and subsequently, for people to emotionally process and regulate. This in turn allowed them to be intentional in their communication with one another. Current design practices emphasize ease of use, however, trauma-informed design highlights how sometimes, what is easy can be harmful or problematic [Jay, 2020]. Intentionally introducing design frictions has been proposed as a way to design for intentional choices, which can be just as important as designing for easy ones [Cox et al., 2016; Chen et al., 2022]. For example, the ease of responding to someone's opinion online with an angry message can deteriorate relationships and impact opinions of how the platform handles conflict [Liu and Weber, 2014; Marwick and Boyd, 2011]. Designs that include additional context to users' opinions and add friction that invites users to pause and reflect may be beneficial [Jay, 2020].

Taken together, participant feedback and existing calls to design for intentional experiences demonstrate how designing for attunement to others is a worthy design goal, and it is attainable through user-centered research and design. Allowing users to update and request the tone of messages, coupled with the ability to pause messages, allowed users to remain in deeper connection during hard conversations. As one of our participants said, no matter how someone is feeling, "*it's best I know.*" By increasing attunement during hard conversations online, designers can increase the quality of people's relationships, which in turn creates healthier, happier people. It is my hope that this work inspires further action towards designing for attuned experiences online.

7.1.2 Dissociation and Attuning to Self

I have worked to demonstrate how normative dissociation commonly occurs online, as I believe it explains why so many people have a paradoxical relationship with social media: they find their use unsatisfactory but

are unwilling to quit [Baughan et al., 2022]. We found that nearly half of our participants reported an experience of dissociating while using Chirp at least once. They described losing track of time, ignoring people in their immediate environment, and becoming all consumed in their scrolling. Our participants described how they viewed social media as a combative environment, where they would have to wrestle between their desire to keep scrolling and their desire to curb their screen time. We found that design can help limit dissociation online, and in particular, sorting content into smaller lists reduced people's dissociation, and reading history labels helped people feel more in control while scrolling.

Dissociation was commonplace in our study, and design features of social media, such as infinite home feeds, increased dissociation. By definition, when someone is experiencing normative dissociation, their ability to self-reflect on their behavior is suspended. Self-reflection is a key aspect of self-attunement [Lamagna, 2011], as it allows the self to communicate and integrate between the experiencing aspect of the self and the reflective aspect of the self. While dissociation can be a part of health functioning, I argue that current designs induce and prolong dissociation, leading to a decrease in self-attunement.

Because of this, I argue that platforms have a responsibility to help people re-engage their awareness and disengage from the platform. This study showed that design features that are already present on some sites, such as *reading history labels*, can disrupt and alleviate dissociation. Wider adoption of these features could help users reap the benefits of dissociation as a healthy mental break, while also feeling secure that they would not overspend their time on the platform.

7.2 Future Directions

Realistically, it is unlikely that large social media companies will deploy features that have the potential to reduce time spent and attention given to their platforms. Therefore, in collaboration with a team of researchers at University of Illinois Urbana-Champagne, I have worked to explore how peer-initiated interventions can influence people to reflect on their social media use and log off. Many large accounts on Twitter are dedicated to reminders to stop scrolling and log off, such as @TheNapMinistry and @doomscroll_bot. We have collected and analyzed peer-initiated intervention posts (PIIP) from large Twitter accounts such as these to understand how these posts affect users. We completed a survey and found that people felt like they were more likely to log off and feel more self-aware when a kindly worded PIIP appeared on their feed.

Because of this, I am excited about the potential for PIIP to support people in regulating their screen time. I plan to continue pursuing how peer and community-driven interventions can help users regain a sense of self-attunement in the absence of design support.

When designing for attunement to others during hard conversations, users could benefit from digital designs that help them self-attune by exploring the layers of emotional distress they experience before, during, and after conflict. For example, journal-style self-reflection prompts could help people to identify which emotions the current conflict has created for them, and then prompt the user to draw connections to other times they have felt similarly. These could be similarly implemented to the Tarot Cards of Tech Group or Gottman Card Decks App Got.

Design has an opportunity to help user self-attune during conflict as well by facilitating pauses that increase emotional regulation. For example, certain design affordances could become foregrounded or obscured in response to a pause, such as needing to take extra steps to post publicly, or a forced pause between messages for a period of time. In the latter case, an intervention to slow down message pace in conversations has led people to both feel frustrated and as though they participated more thoughtfully Masrani et al. [2023]. Alternatively, one could be led through exercises from DBT (dialectical behavior therapy), if a pause were initiated. As our participants stressed, it is best if the need for a pause was expressly indicated to both users, rather than one user walking away from the discussion without responding, as this mirrors *turning away*, which is the most harmful response to bids for connection in relationships Driver and Gottman [2004].

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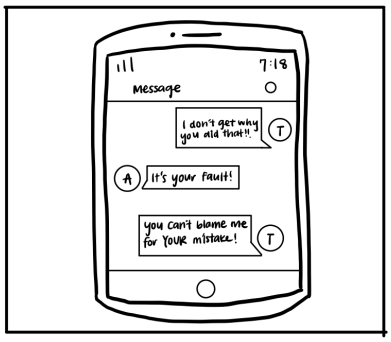
Chapter A

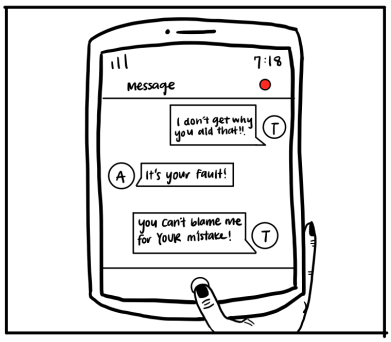
Appendix

A.1 Storyboards

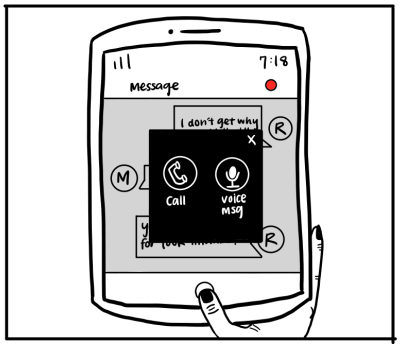
Managing Space



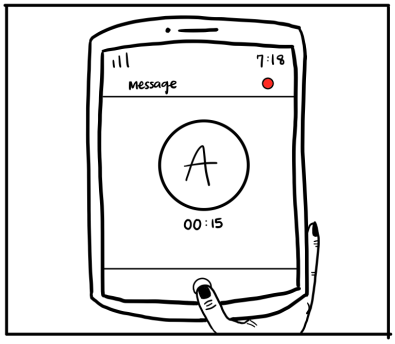
Tom and Alex are engaged in an argument over chat, as usual.



As Tom puts his finger on the home button of his phone, it detects his heartbeat. And there is a heartbeat detector in th chatroom. Once Tom's heartbeat reaches a certain limit, it blinks red.

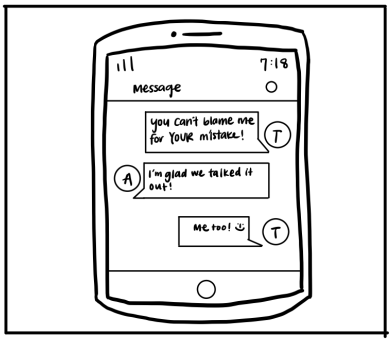


While Tom is messaging Alex while his heartbeat is blinking red, or an algorithm that monitors the use of hate or flagged words in the chat, two options will come up: 1) Call or 2) Send a voice message. Tom also has the option to exit and pick neither one if he chooses to.



Tom decides to call Alex.

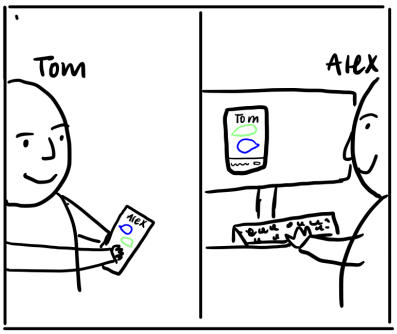
Tom and Alex have a talk over the phone instead of texting.



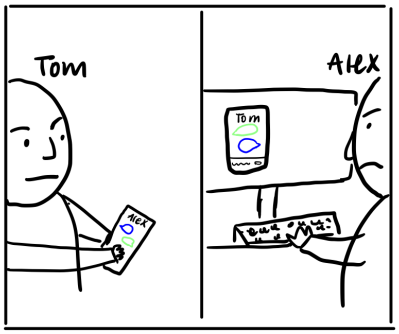
And they resolve their argument.

Figure A.1: Biofeedback

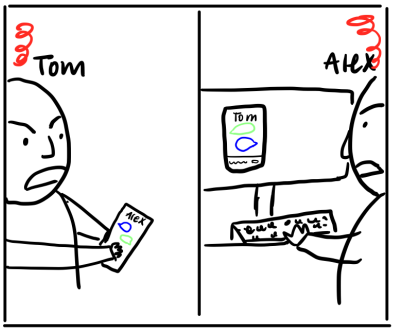
Facebook Block



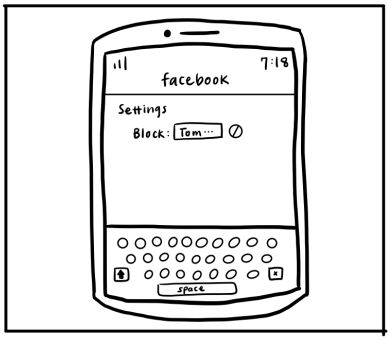
Tom and Alex are friends who live in different states. They frequently chat with each other through social media and messaging apps.



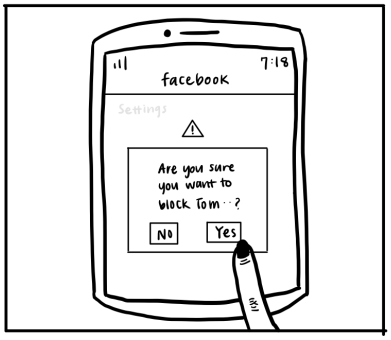
During their chat, Tom says something that Alex strongly disagrees with and expresses that to Tom through chat.



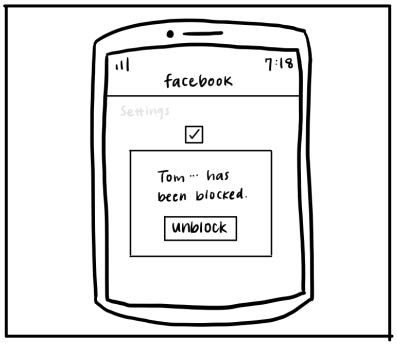
The conversation quickly becomes an emotionally charged argument between the two. And Tom leaves the chatroom without replying.



The agument gets to the point where Alex decides to block Tom so Alex navigates to the setting.



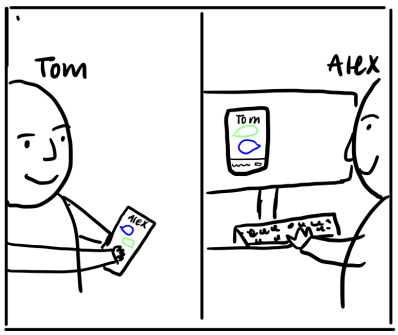
Alex thinks twice befor he actually blocks Tom due to the Facebook warning/ reminder.



Alex proceeds anyways and can no longer see messages or posts from Tom.

Figure A.2: Block

Censorship



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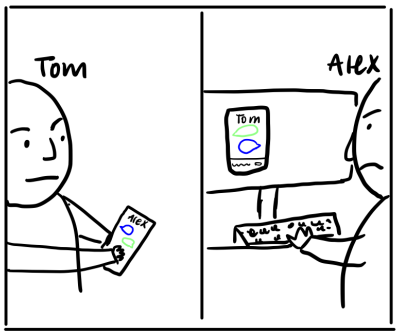

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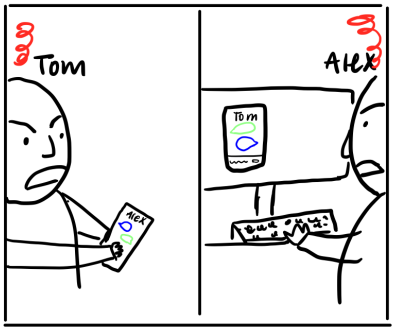

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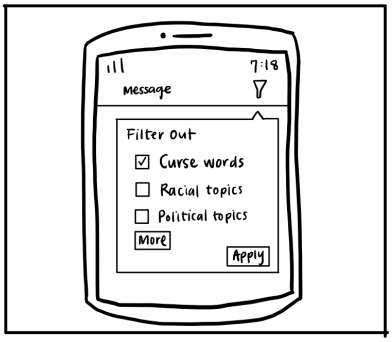
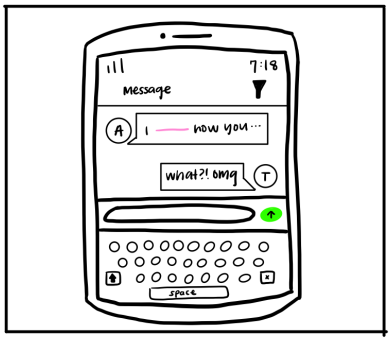


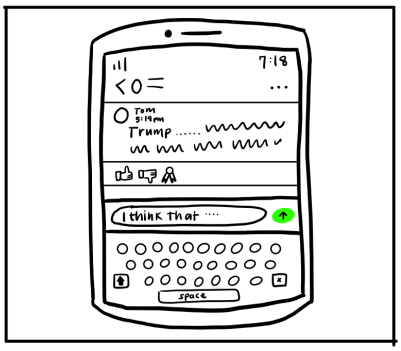
Seeing Alex cursing, Tom decides to filter out curse words.



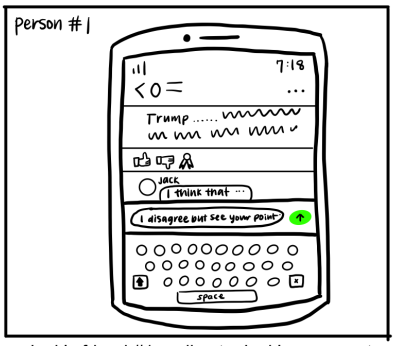
When Alex sends messages with curse words, the app will filter it out.

Figure A.3: Censorship

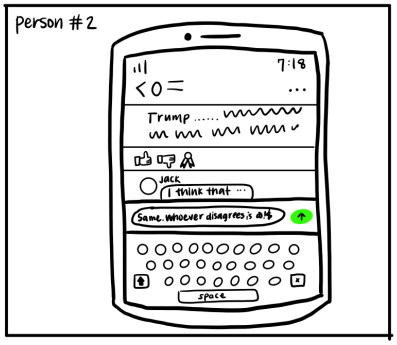
Audience



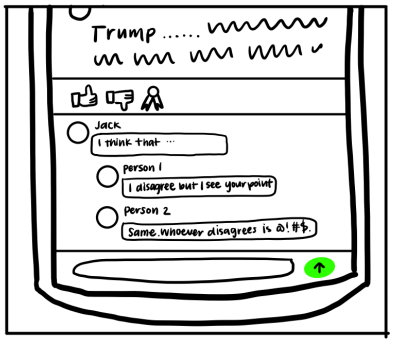
Jack comments on a controversial political post with his opinion.



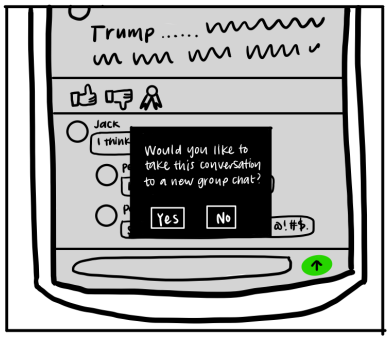
Jack's friend #1 replies to Jack's comment arguing against Jack's stance.



Jack's friend #2 (who isn't friends with Friend #1) replies and supports Jack's stance with an offensive comment against people who think otherwise.



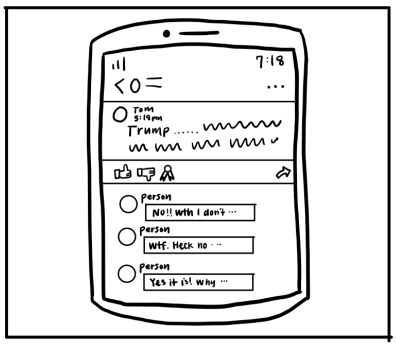
The two friends' comments on Jack's comment.



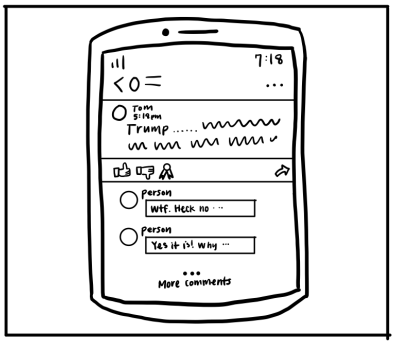
The app suggests that they take the conversation to a new group chat to prevent the argument from getting worse and involving more people.

Figure A.4: Channel Switching

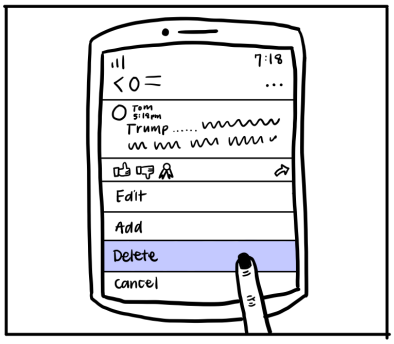
Delete entire post



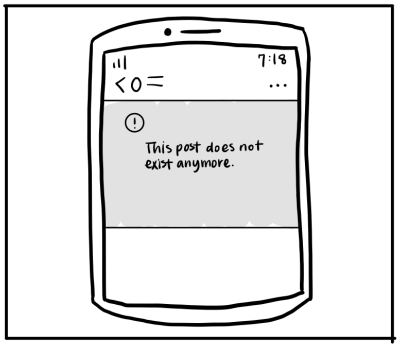
Tom makes a post with his opinion on a contoversial topic.



Then people who strongly disagree with Tom make comments on Tom's post. Tom wants to explain, but it turns into an argument.



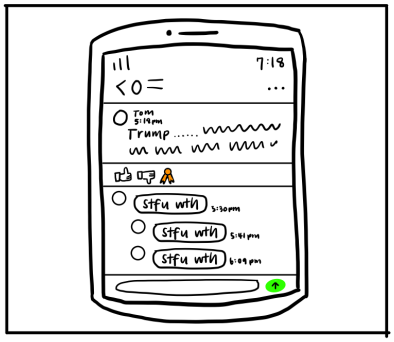
Realizing there is no way to resolve this conflict, Tom eventually decides to delete this post.



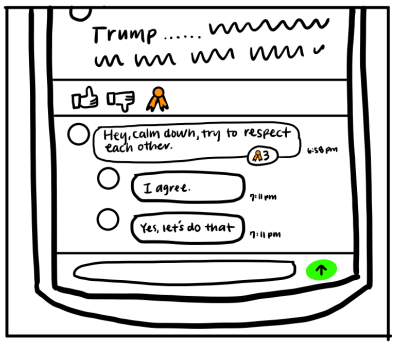
If others try to access the post, the page indicates that the post does not exist anymore.

Figure A.5: Deleting content

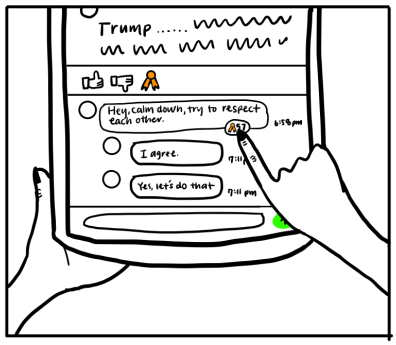
Democracy



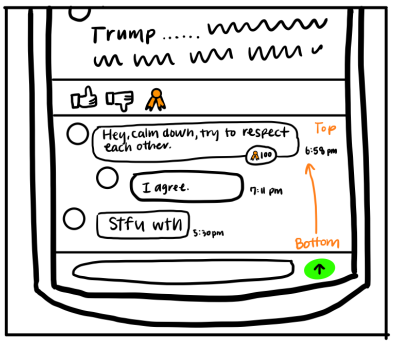
Jack reads through comments on a heated political post and sees nothing but chaos.



Jack finds a constructive comment buried at the bottom and decides to use the “constructive” button on it.



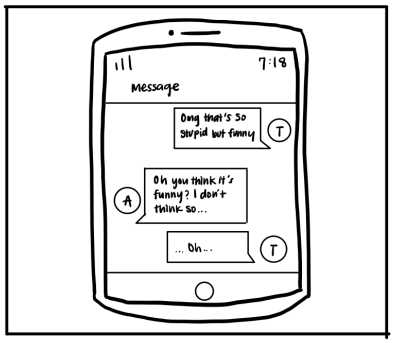
Other people proceed to do the same and gradually the comment gains visibility.



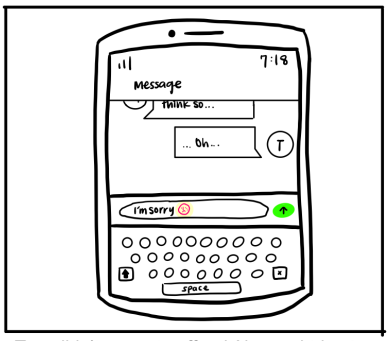
So the comment moves from the bottom to the top and reduces he tension of the post.

Figure A.6: Democracy

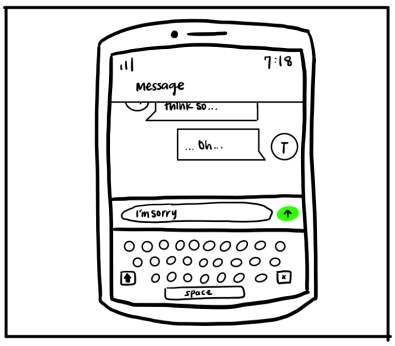
Emoticons



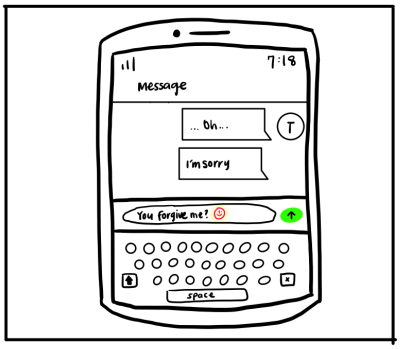
Tom and Alex are having a conversation. Tom says something that offends Alex and things might get heated.



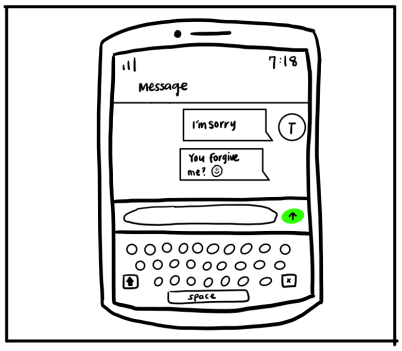
Tom didn't mean to offend Alex and tries to diffuse a fight from occurring so he apologizes. And the app suggests an emoticon thatgoes with what Tom is texting.



Tom disregards the suggestion so the emoticon suggestion disappears and Tom sends the message as is.



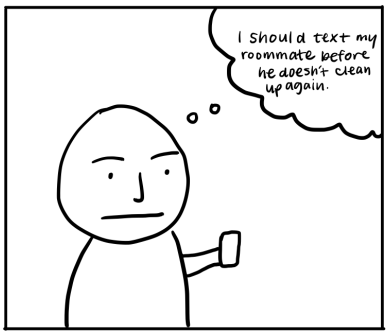
Tom writes another message asking for forgiveness and the app suggests another emoticon that goes with the context of the message.



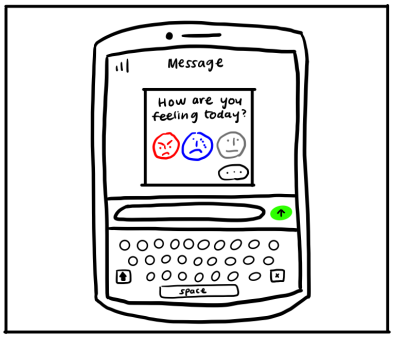
This time, Tom accepts the suggestion and sends the message with the suggested emoticon.

Figure A.7: Emoticons

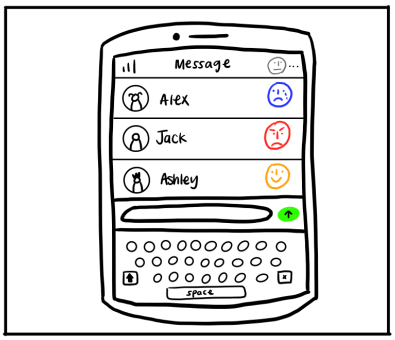
humanizing



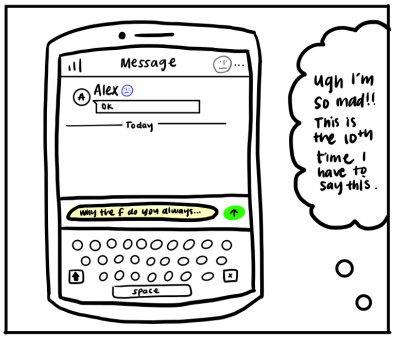
Tom is frustrated with Alex because Alex frequently makes a mess at their house and rarely clean up. So Tom decides to text Alex to show his anger and frustration.



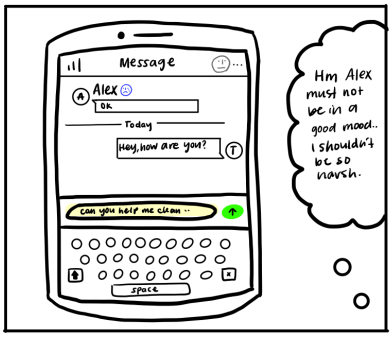
In order to text Alex, Tom opens his messaging app. This is his first time opening the app so it reminds him to indicate his current mood.



Once on the app, Tom is able to chat with his friends but also see their current moods/statuses.



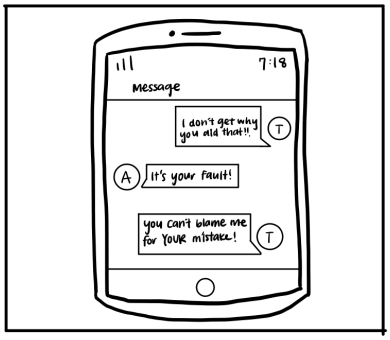
Even within the chatroom, Tom is able to see his friend's current mood. Initially, Tom is so frustrated that he writes an angry message.



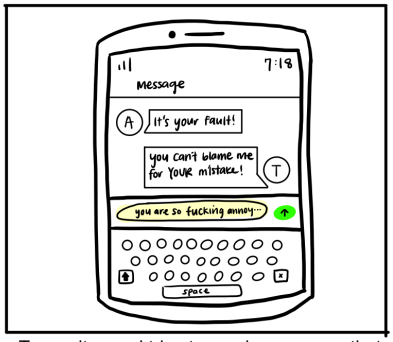
However, Tom sees that Alex is actually in a sad mood today. So Tom decides to write kinder, considering Alex's mood.

Figure A.8: Humanizing

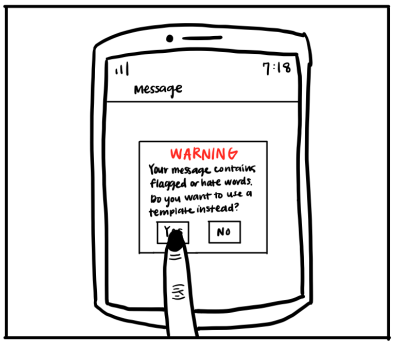
Reasoning



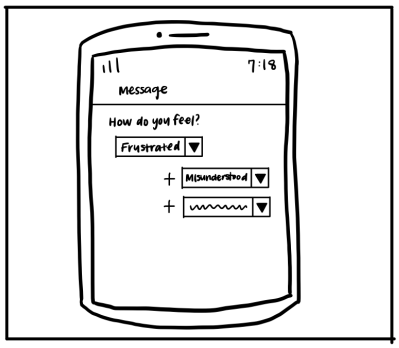
Tom and Alex are engaged in an argument over chat, as usual.



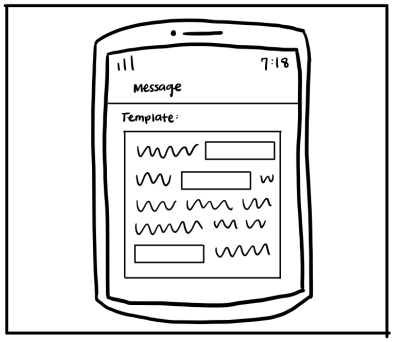
Tom writes and tries to send a message that contains hate or flagged words which the app detects.



Before the message is sent, a pop up message shows up on the screen for Tom to choose if he wants a template. If he chooses no, it will go back to the previous screen, allowing him to edit or send the message as is.



If Tom chooses yes, the app will first have him choose words and categories based on his emotion and thoughts of the chat/ argument.



The app will then generate a template for him based on those categories which Tom will be able to type in the blanks of the template to send to Alex.

Figure A.9: Reasoning

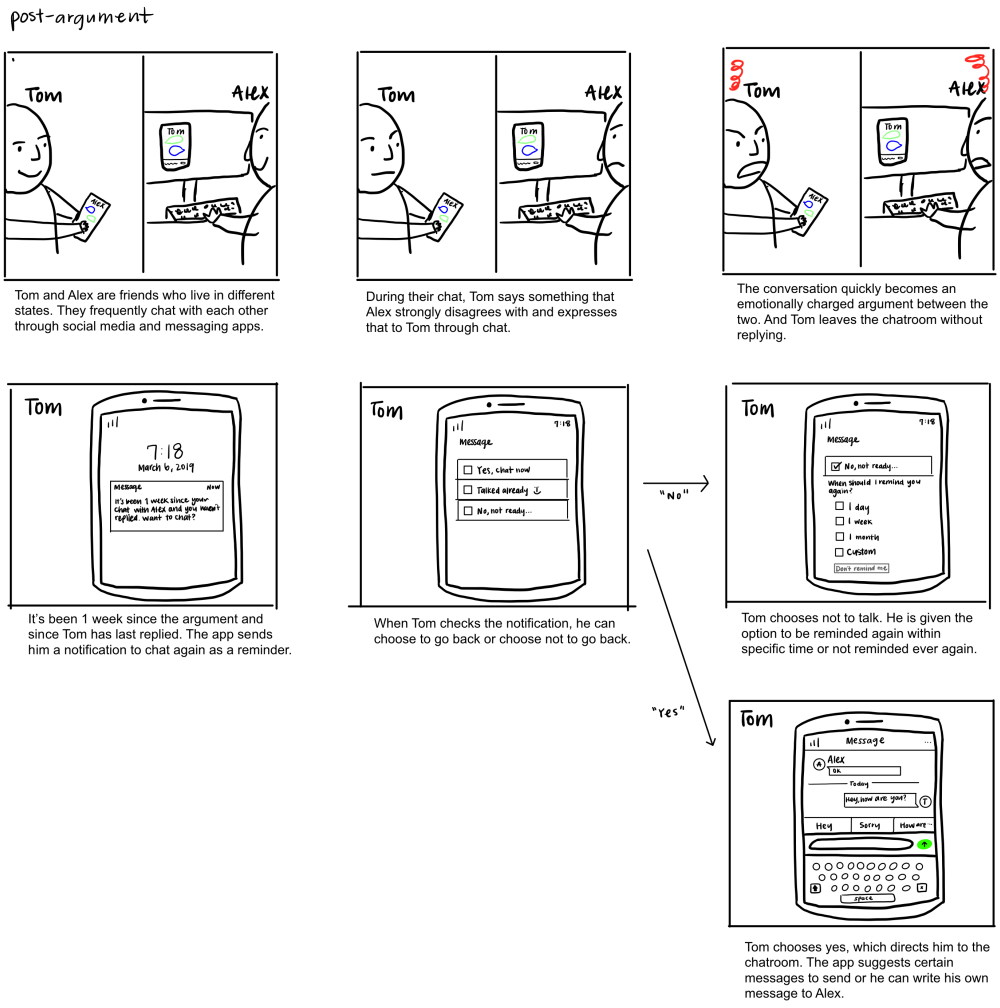
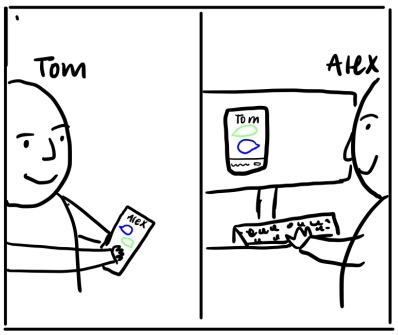
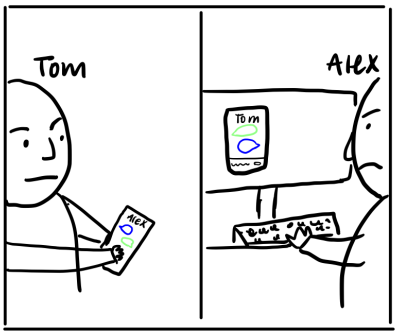


Figure A.10: Reflection

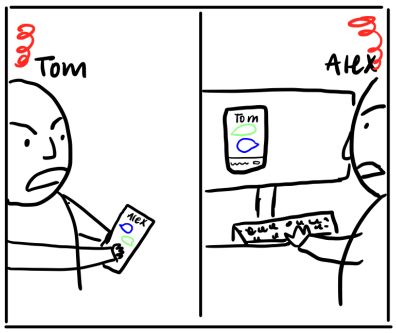
Limitations



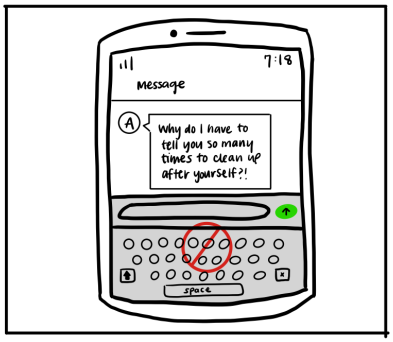
Tom and Alex are friends who live in different states. They frequently chat with each other through social media and messaging apps.



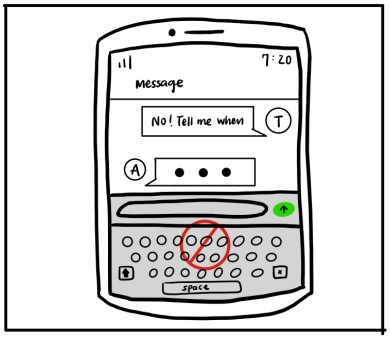
During their chat, Tom says something that Alex strongly disagrees with and expresses that to Tom through chat.



The conversation quickly becomes an emotionally charged argument between the two. And Tom leaves the chatroom without replying.



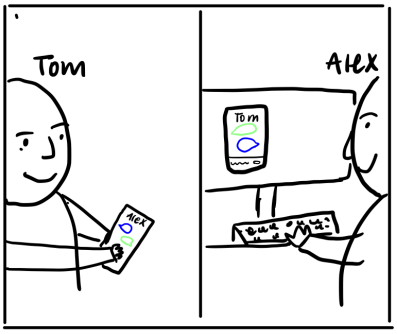
When Tom receives a long message from Alex, the keyboard will be blocked for at least 30 seconds for Tom to read through the entire message.



When Alex is typing, the keyboard will also be blocked for Tom, giving Alex time to fully express his opinion. Also, Tom is given time to reflect on every point made be Alex.

Figure A.11: Rules of Engagement

slow down



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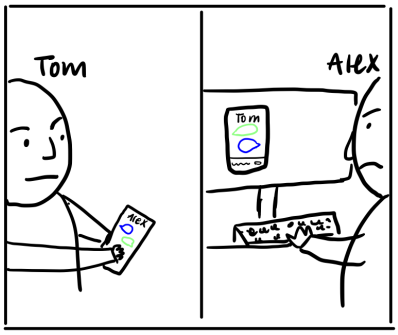

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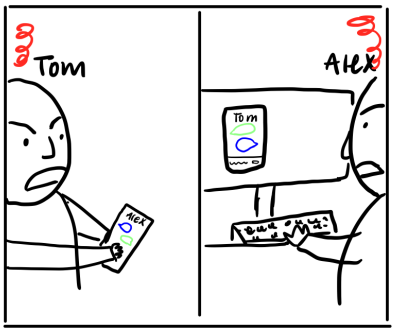

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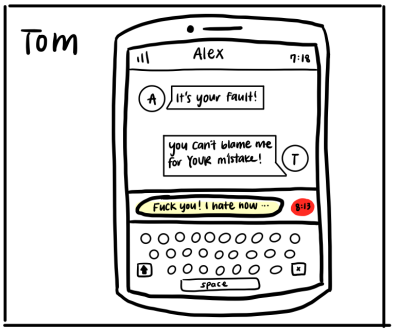
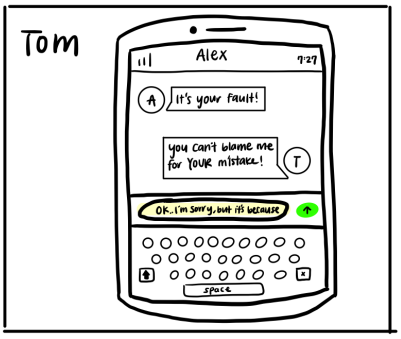


Algorithmically the app detects that the two are engaged in an argument. Although chatting room can be accessed and users are able to write messages, they can't send the message for a set period of time as the message is put into a queue.

While the message is in queue, users are able to edit, delete, and add their message. Time out will enable users to rethink their previous message, calm down and make changes accordingly.



Once the timer is over, chatting is enabled again and the message that was in queue can be sent. Also, the two are able to have immediate conversation again.

Figure A.12: Speed Bumps