

# “Am I Never Going to Be Free of All This Crap?” Upsetting Encounters With Algorithmically Curated Content About Ex-Partners

ANTHONY T. PINTER, University of Colorado Boulder

JIALUN “AARON” JIANG, University of Colorado Boulder

KATIE Z. GACH, University of Colorado Boulder

MELANIE M. SIDWELL, University of Colorado Boulder

JAMES E. DYKES, University of Colorado Boulder

JED R. BRUBAKER, University of Colorado Boulder

Every day on social media, people see streams of content curated by algorithms that leverage their relationships, preferences, and identities. However, algorithms can oversimplify the complexity of people’s social contexts. Consequently, algorithms can present content to people in ways that are insensitive to their circumstances. Through 19 in-depth interviews, our empirical study examines instances of contextually insensitive content through the lens of people’s upsetting encounters with content about their ex-romantic partners on Facebook. We characterize the encounters our participants had with content about their exes, including where on Facebook it occurred, the types of social connections involved in the content, and participants’ perceptions of why the content appeared. Based on our findings, we describe the “social periphery”—the complex social networks and data that enable inferred connections around otherwise explicit relationships—and discuss the design challenges that the periphery presents designers.

CCS Concepts: • **Human-centered computing** → **Empirical studies in collaborative and social computing**; *Social networks*; Social networking sites.

Additional Key Words and Phrases: relationship dissolution; algorithmic curation; social media; negative experiences; empirical work

## ACM Reference Format:

Anthony T. Pinter, Jialun “Aaron” Jiang, Katie Z. Gach, Melanie M. Sidwell, James E. Dykes, and Jed R. Brubaker. 2019. “Am I Never Going to Be Free of All This Crap?” Upsetting Encounters With Algorithmically Curated Content About Ex-Partners. *Proc. ACM Hum.-Comput. Interact.* 3, CSCW, Article 70 (November 2019), 23 pages. <https://doi.org/10.1145/3359172>

## 1 INTRODUCTION

Social media platforms rely on algorithms to curate and present people with content ranging from posts and events, to people with whom they might have connections. Algorithms excel at

---

Authors’ addresses: Anthony T. Pinter, University of Colorado Boulder, Department of Information Science, [anthony.pinter@colorado.edu](mailto:anthony.pinter@colorado.edu); Jialun “Aaron” Jiang, University of Colorado Boulder, Department of Information Science, [aaron.jiang@colorado.edu](mailto:aaron.jiang@colorado.edu); Katie Z. Gach, University of Colorado Boulder, ATLAS Institute, [catherine.gach@colorado.edu](mailto:catherine.gach@colorado.edu); Melanie M. Sidwell, University of Colorado Boulder, Department of Media Studies, [melanie.sidwell@cu.edu](mailto:melanie.sidwell@cu.edu); James E. Dykes, University of Colorado Boulder, Department of Information Science, [james.dykes@colorado.edu](mailto:james.dykes@colorado.edu); Jed R. Brubaker, University of Colorado Boulder, Department of Information Science, [jed.brubaker@colorado.edu](mailto:jed.brubaker@colorado.edu).

---

Permission to make digital or hard copies of all or part of this work for personal or classroom use is granted without fee provided that copies are not made or distributed for profit or commercial advantage and that copies bear this notice and the full citation on the first page. Copyrights for components of this work owned by others than the author(s) must be honored. Abstracting with credit is permitted. To copy otherwise, or republish, to post on servers or to redistribute to lists, requires prior specific permission and/or a fee. Request permissions from [permissions@acm.org](mailto:permissions@acm.org).

© 2019 Copyright held by the owner/author(s). Publication rights licensed to ACM.

2573-0142/2019/11-ART70 \$15.00

<https://doi.org/10.1145/3359172>

these tasks, often surfacing content and connections that people were not aware existed. However, not all connections are desirable. People know better than to invite a friend to their ex-partner's engagement party or suggest calling a deceased friend, but the algorithmic systems that underpin social media sites often lack the contextual understanding required to not make these sorts of troubling suggestions. As a result, algorithmically curated content can feel insensitive when it breaks social norms or brings up painful memories. Facebook's "People You May Know" feature, for example, is designed to recognize connections between people with mutual friends and suggest that they connect. But what if a connection is an ex's new partner?

Offline, breakups can range from awkward to awful, inspiring a gamut of emotions for former partners and people in their networks. Typically, these feelings fade with time and distance as ex-partners grow apart emotionally and physically [7, 17]. However, most contemporary relationships also exist online, where they are represented on social media platforms through tagged photos, mutual friends, and entire conversations that form a digital timeline of the relationship [67]. Emotional distance and physical space are predictors of healthy recovery in the wake of a breakup [40], but such distance can be difficult to achieve when connections persist online [60]. As a result of persistent connections, even algorithms designed to encourage reminiscence and well-being (e.g., [34, 37]) can produce insensitive encounters long after a relationship is over. For example, Facebook's Memories feature might show a photo that reminds a person of a family vacation from a time when they were still married. Examples like this demonstrate the importance of considering peoples' well-being as we design algorithmic systems, particularly those that aim to promote reminiscence and reflection. We focus on romantic breakups in the work we present here, yet the contextual factors we explore may also inform the design of algorithmic systems across a number of emotionally sensitive situations, such as in the wake of a death or traumatic event like a house fire.

In this paper, we investigate unexpected and upsetting encounters with social media content as a result of algorithmic curation. We focus on romantic relationship breakups as a specific case of such encounters to 1) better understand instances where algorithms make insensitive suggestions or recommendations and to 2) identify design opportunities to mitigate these experiences. We chose to examine breakups because they are a human experience that is represented in social media systems and is a frequent event that creates opportunities for unexpected and upsetting encounters to occur. Through an analysis of 19 interviews, we characterize the encounters participants experienced, describe how they interpreted the cause of the encounter, and how they subsequently assigned fault and responsibility for the experience to the platform, people in their social networks, and themselves. We then detail how participants approached options to mitigate these encounters—most notably unfriending—and how, despite their best attempts, upsetting encounters often persisted.

Based on our findings, we argue that upsetting algorithmic encounters are the byproduct of systems that do not understand the social context of the data they possess, let alone how to sensitize the presentation of content or recommendations in ways that people would find socially appropriate. We discuss three challenges to creating more sensitive designs that arise from our results: the limits of data representing complex social experiences such as romantic relationship breakups, the broader networks that surround such data and their impact, and omissions from the available data that limit algorithms' ability to understand context and act compassionately towards people.

We use the term "social peripheries" to describe the social connections that arise around a core relationship, like the friendships one might form with a romantic partner's family members. We discuss the challenges that these peripheries present to algorithm designers as a result of the complexity of social realities, and highlight how mistranslations and misrepresentations can occur when representing social peripheries in data. Our work sits in conversation with scholarship on tie strength (e.g., [11, 27]), friending (e.g., [66], context collapse (e.g., [44, 65]), and latent ties (e.g.,

[31]), but focuses specifically on the disconnect between how people think about social connections in their daily lives and how those connections appear as a result of the data and algorithms in SNSs. Given the rise of algorithmic curation on social platforms, our study highlights the growing impact of inferred connections and demonstrates how social peripheries require designers to consider how connections are represented as they create platforms powered by algorithms that recommend, suggest, and connect.

## 2 RELATED WORK

To situate our study, we begin by examining work focused on relationship dissolution and the impact of online environments and digitally mediated relationships on the process of relationships dissolving. We then turn to emerging work on human-centered approaches to algorithms, positioning our study as an instance of upsetting algorithmic encounters. We draw from these two fields to identify gaps in understanding about the impact of curation algorithms on people's experiences during relationship dissolution, and to emphasize the need for more research on automated systems that include digital representations of relationships.

### 2.1 Relationships and Their Ends

Relationship dissolution is a widely studied phenomenon, with research from psychology [42, 63], psychiatry [50], communications [17], and counseling and social work [48] devoting attention to the factors that lead to dissolution and its effect on the stakeholders of the relationship. When going through a breakup, people undertake a variety of actions to mitigate the negative impacts of the experience, like impression management, relational cleansing, and mourning [17] which can help them cope with and move on from the past relationship.

As our lives are increasingly interconnected via social media, the ways that our relationships are enacted and dissolved have similarly moved into online spaces [22, 52]. What was once a socially enacted connection (i.e., "This is my partner" in conversation) has become technically encoded into spaces such as Facebook with its "Relationship Status" feature. Changing one's relationship status on Facebook (i.e., making it "Facebook official") is commonly considered part of the natural progression of a romantic relationship [47] and viewed as a significant milestone [23, 24, 56]. Not reaching the "Facebook official" milestone can negatively impact the relationship or, in some cases, cause the relationship to dissolve [62].

While becoming "Facebook official" is often presented as a positive milestone in a relationship, "Facebook official" disclosures can occur during breakups as well, and thus serve as a negative relationship milestone [41]. People's experiences vary, from using Facebook to openly discuss a breakup, to changing their relationship status, to avoiding disclosure altogether [30]. However, the breakup-related features on Facebook can be confusing. Moncur et al. [49] found that some people change their relationship status without realizing that, due to their privacy settings, the change would result in a public, comment-enabled update. Other work pointed to the traps presented by murky social norms and ease of access, enabling people to surveil their ex-partner [64].

The "Facebook official" milestone (i.e., explicitly adding or removing a relationship to one's profile) is not the only way in which relationships are performed on the platform. Relationships leave behind digital traces like timeline posts, tagged photos, and comments on posts that both partners and their networks can see [18, 47]. Relationships commonly result in extensions of one's social network, with friends and family of a partner requesting to be connected to the other partner online; connections that most people (90%) do not remove in the aftermath of the breakup [41]. These digital markers are frequent pain points for people dealing with a breakup [60], suggesting that platforms might incorporate features to make managing or deleting remnants from relationships easier, thereby enabling people to better cope [32]. Research has yet to address how algorithmic

systems might best handle social connections that arise alongside romantic relationships when those relationships end. Yet when systems are ignorant of such social connections, they can inadvertently produce interactions without the contextual understanding that someone may not want to, as our data shows, unfriend an ex-partner's mother for fear of social repercussion.

## 2.2 Human-Centered Approaches to Algorithms

The rise of interest in artificial intelligence has predominantly focused on computational innovations and methods that often fail to capture social nuances, affective relationships, and other human-centered concerns [5]. The lack of nuance is echoed in work on “algorithmic fairness” that seeks to minimize disparate impacts (e.g., [21]).

In response to these issues, critical algorithm studies has called for further research focused on where people and algorithms meet. A dominant thread in this scholarship has focused on the lack of opacity and impenetrability of algorithms [12, 16, 26, 53, 59], with various calls to “audit” algorithms as a means of accountability [16, 59]. Opacity, however, may be unavoidable. Burrell, for example, describes three sources of algorithmic opacity—intentional corporate or state secrecy, technical illiteracy, and the way that algorithms operate at scale—and argues that transparency and audits may not be realistic. Instead, she argues that, in addition to strategic partnerships, users and their lived experiences should play an important role in the design of algorithms as a means of working around the opacity that often accompanies algorithms after they have been deployed into the real world [12].

The unpredictable outcomes of algorithms have resulted in some upsetting experiences for people, from Eric Meyer's experience of Facebook's Year in Review that featured his deceased daughter [46], to people's surprise and anger when they learned Facebook's News Feed was not showing some of their friends' posts [20]. Rader & Gray [55] demonstrated this general confusion in their study examining peoples' theories about the composition of their Facebook News Feeds, and found that people formed folk theories based on their unique experiences—theories that did not apply to the system as designed. In a follow-up study, Rader found that algorithmic awareness may shape how people understand the content they see on their News Feed [54]. DeVito et al. [15] echoed the findings of Rader & Gray [55], noting these folk theories are often complex and draw from numerous experiences and sources of information, and impact peoples' decisions to post on social media.

When people become aware of the existence of curation algorithms and form theories about how they worked (whether right or wrong), some change their behavior to make the algorithms produce their desired output, while others conclude that they are helpless to change a platform that is powerful, perceptive, and ultimately unknowable [19]. This learned helplessness suggests that negative content coming from opaque algorithms can be especially distressing because users do not understand why they are seeing the content. Addressing this concern, prior research has argued that when dealing with sensitive content, designers of algorithms should think carefully about the social context where the algorithm is used, and the ways it will shape the interactions users have with and around it [35].

## 3 METHODS

To understand people's upsetting experiences with algorithmically curated content, we conducted 19 semi-structured interviews with adult Facebook account holders in the United States. Participants were recruited via public posts on social media and through a related class at a large public university. Each participant self-identified as having had an unexpected, upsetting experience with content about an ex-partner on Facebook. Upon completing 15 interviews, exceeding the most common

Table 1. Participant Demographics and Types of Relationships Prior to Breakup

Participant	Age	Gender	Sexual Orientation	Relationship Type	Relationship Duration	Time Since Encounter**
P01	38	F	Straight	Co-habitating	4 years	1 year
P02	30	M	Straight	Dating	1+ years	2 years
P03	34	M	Straight	Married	13 years	ongoing
P04	24	M	Straight	Dating	2 months	2 months
P05	28	M	Bisexual	Co-habitating	6 years	2 months
P06	28	F	Lesbian	Married	*	ongoing
P07	30	F	Lesbian	Dating	1+ years	3 months
P08	42	F	Straight	Married	*	*
P09	21	F	Lesbian	Dating	1 year	1.5 years
P10	19	M	Straight	Dating	1.5 years	1.5 years
P11	42	F	Straight	Co-habitating	3 years	1.5 years
P12	37	M	Straight	Married	2 years	1+ years
P13	45	F	Straight	Married	15 years	ongoing
P14	46	M	Straight	Married	*	*
P15	38	F	Straight	Co-habitating	10 years	1+ years ago
P16	30	F	Straight	Married	*	*
P17	27	F	Straight	Married	7 years	ongoing
P18	40	F	Straight	Married	*	*
P19	38	F	Straight	Married	4 years	*

\* data unavailable for participant

\*\* as reported at the time of the interview

sample size for qualitative HCI research [14], all authors agreed that saturation had been reached. Four additional interviews were conducted to gain a deeper understanding of emerging themes.

Interviews ranged in length from 30 to 90 minutes and were conducted in person ( $n = 1$ ) or over the phone ( $n = 18$ ). Participants' ages ranged from 19 to 46 ( $M = 30.56$ ,  $SD = 6.58$ ). Details about the participants, including age, gender, sexual orientation, and type of relationship before breakup are presented in Table 1.

The interviews consisted of three parts. We started by asking participants to tell us about their upsetting encounter with Facebook content relating to an ex-partner. Participants detailed a variety of experiences that occurred at any point from 6 days to 5 years after the breakup. The second portion of the interview consisted of semi-structured questions tailored to the participants' narratives as interviewers sought more nuanced insight around the relationship and the upsetting experience. The third portion of each interview focused on specific Facebook features that could potentially enable participants to prevent such upsetting encounters (e.g., unfriending), with a focus on the features that participants discussed during the first phase of the interview. Features discussed

included News Feed, On This Day<sup>1</sup>, Events, and Friend Suggestions. We also asked participants about their uses of privacy management features that are designed to address upsetting content, like unfollowing, blocking, and Facebook's recommended practices and tools following a breakup [2]. Before analysis, all interviews were transcribed, anonymized, and assigned the participant IDs presented here.

We performed a thematic analysis of the interview transcripts [9]. All authors divided the interview transcripts evenly and independently engaged in one round of open coding. Over a series of discussions, we reviewed the codes generated and formed concept maps of all authors' findings, identifying and organizing codes into higher-order categories. We then discussed emerging themes, connecting them to categories such as "reference to algorithms," or "inaccurate representation of the relationship." Between discussions, each author wrote detailed memos describing our participants' experiences [58], which helped us identify preliminary categories and identify thematic relationships between these emergent groups of codes. Through two more rounds of transcript reviews and iterative coding, we combined similar codes to create higher-order categories such as "Relationship Management." We then used these categories to produce a set of theme memos that analytically described the themes and grounded them in the interview data. Finally, the authors discussed the memos as a means of evaluating their efficacy, resulting in further clarification of the themes themselves, and their relationships to each other. The analysis resulted in the four principal findings we discuss below.

## 4 FINDINGS

Our analysis of upsetting encounters with Facebook content related to ex-partners identified four dominant themes. We begin by identifying and characterizing three places on Facebook where upsetting algorithmic encounters frequently happen, showing how encounters occur across specific features such as News Feed or Memories, as well as social spaces within the platform, such as Event pages. Next, we examine how participants interpreted the causes of their encounters, noting that while participants most often blamed themselves or Facebook, they assigned blame to other parties as well. Building on our participants' interpretations, we then discuss features within Facebook, such as unfriending, that are designed to reduce the visibility of undesirable content, but often are not viable when put into practice. Finally, we describe the what we call the *social periphery*—that is, the social connections that exist as a direct result of the ex-partners' relationship—and how mistranslations into data can result in upsetting encounters.

### 4.1 Characterizing the Encounters

Our participants primarily encountered upsetting content about their ex-partners in three different places on Facebook: News Feed, On This Day, and Shared Spaces. We describe these upsetting encounters according to the feature or space in which they occurred, and how our participants reported being affected by their experiences with the encounters.

**4.1.1 News Feed.** According to Facebook, News Feed shows "stories that matter most to you," through metrics based on the person posting, type of content, and interactions with the post [1]. These stories included friends' life events, including positive events such as new jobs, geographic re-locations, and changes to relationships, but our participants also identified them as a main source of upsetting encounters post-breakup. Six participants reported seeing upsetting content about their ex-partners in News Feed, the primary interface that appears when one opens the Facebook website or mobile app. Our participants were bothered by their ex-partners announcing their new

<sup>1</sup>During the course of this study, On This Day was integrated into Facebook's Memories feature [33]. Throughout this paper, we use the term "On This Day" to discuss the experiences participants had with this feature.

romantic partners on Facebook, which then appeared as a prominent update in our participants' News Feeds:

I see on Facebook that she's in a relationship. She's the one that has made it Facebook official... Why did Facebook decide to show me that, you know, at the top of my News Feed? (P04)

The context of P04's story exacerbated his upsetting experience—his ex-girlfriend had broken up with him shortly after he one-sidedly went “Facebook official” about their relationship, a declaration she found objectionable. P09 had an encounter similar to P04's, in which other contextual factors added to the pain of seeing her ex-girlfriend's new relationship appearing prominently on her News Feed:

I went to one of my roommates... and I was like, “I cannot even believe this.” And then I look at the Facebook post of [my ex's new relationship] more, and noticed all the people that had liked it, and I was like, “Wait, you already knew this?” And then I looked at the date and it had happened like two days ago, and I just hadn't checked Facebook for two days but it was still the thing that showed up at the top. (P09)

P09's dismay in seeing an unexpected post on her News Feed was a common experience among our participants. Participants noted being unaware of the existence of the algorithmic system until after having a bad experience. Their unawareness aligns with Eslami et al.'s [20] findings in which people were upset when discovering that algorithmic curation had resulted in omissions of important updates. But in cases like P09's, however, the omission of information was not the problem—the update did appear—but the new information, and her friends' interaction with it was painful in the context of her recent breakup.

**4.1.2 On This Day.** While some participants reported upsetting encounters as they discovered new information, others shared encounters with painful memories from the past. Unsurprisingly, this was commonly discussed in relation to Facebook's On This Day feature. Ten participants encountered painful memories in On This Day, which were often pictures or interactions that at face value might seem positive. However, when viewed through the lens of a breakup, these reminders became upsetting for our participants. P03, for example, was reminded of a sweet, years-old message from his now-ex-wife:

The most upsetting thing on Facebook is On This Day!... it said I was the best husband ever and she loved me the most... I remember that, and obviously not physically being hurt, but just feeling an emotional wallop of like “Fuck, that wasn't that long ago.” (P03)

P03's experience, where a happy memory was transformed into an upsetting one in the context of a difficult divorce, is illustrative of the experiences participants had with On This Day and the memories the feature showed them. Psychologists refer to these transformations as “contamination sequences” [45], noting their negative impact on personal growth [51] and well-being [37]. However, these transformations may be hard to avoid. Participants described strategies to avoid upsetting content—here, most frequently, deleting old posts—but despite their efforts, On This Day feature still resurfaced content from their former relationships:

I went into my Facebook and I started scrolling back through my feeds and just deleting everything I could find that was on my Timeline related to that relationship... I still didn't get everything because... when I go into the On This Day app, sometimes stuff that wasn't on my timeline but is still part of my Facebook profile would appear. (P12)

On This Day ideally brings back good memories, but in the context of relationships and their breakups, the definition of “good” shifts over time—what used to be good can become upsetting. The

upsetting encounters our participants described suggest that static operationalizations of “good,” like positive reactions and numerous comments, can backfire in unexpected ways.

**4.1.3 Shared Spaces.** While upsetting encounters were particularly pronounced in News Feed and On This Day, participants told us stories about upsetting encounters facilitated by mutual friends in a variety of spaces on the platform where social interactions occur. Eleven of our participants encountered upsetting content in shared spaces—that is, online spaces visible to participants as the result of the overlapping social networks between them and their ex-partners, such as in groups or event pages. For example, P05 was bothered by encountering his ex-partner in a comment thread on a mutual friend’s page:

There wasn’t a single particular time as much as there were many miniature times that I felt uncomfortable with my online presence with him around. He was just commenting on a [mutual] friend’s picture and like, it wasn’t really what he said in the comments that upset me. It was his presence in general that was upsetting because that just meant that this was a place where I could access but I would not be welcome there. (P05)

P05’s ex-boyfriend unfriended him after they broke up, so his comment would not have been featured in P05’s News Feed. However, the shared space of their mutual friend’s picture allowed the encounter to happen even though the digital relationship between the two of them had been severed. The presence of the ex-partner made a formerly positive space unwelcoming to P05, limiting their desire to interact with the mutual friend.

Unlike P05’s story, in which he only unfriended his ex-boyfriend, P15 blocked her ex-husband and any mutual friends, as well as his family. Even so, P15 still encountered an upsetting friend suggestion:

Around the time of the divorce I was getting People You May Know suggestions of his girlfriend’s relatives, which was bizarre... My husband’s now-wife, who at the time was his girlfriend, she was married to a woman at the time, and I was getting “People You May Know” of her wife’s relatives. (P15)

P15 was not only unhappy but also confused by these friend recommendations, especially because she thought unfriending mutual friends would create enough virtual distance that the system would stop recommending overlapping connections:

I think Facebook needs to somehow put into play that, when you block someone, you shouldn’t be offering that person’s family as People You May Know, or friends. Especially if you had no mutual friends with those people. I can understand, if one of my ex’s friends that he may have now, we have 14 mutual friends, I can get why Facebook would connect us together. But when there is zero mutual friends, it is very bizarre. (P15)

The algorithm seems to have traced unexpected paths through these people’s networks, resulting in recommendations of people that participants would never expect to know. These remote, unwanted connections are unlikely to happen in offline settings, but were surfaced by recommendation algorithms, and presented as people one might want to be “friends” with.

While unfriending did not eliminate upsetting algorithmic encounters for either P05 or P15, it was at least an option for them. For other participants, the upsetting content came from people they *had* to be friends with. Take P11 as an example:

I go through my photos [of my ex-boyfriend] as good as I can, and delete or make private so that they’re not ... constantly popping up... And yet on my family’s pages it still has some of these photos. And I can’t necessarily delete my family, so I still see them, even though I don’t want to. (P11)

P11 tried to remedy the situation by untagging herself from these pictures, which received criticism from her family:

I have to go through the process of de-tagging myself from my family's photos, which kind of gets them a little riled up and pissed off. Like "What did I do? Why are you mad at me?" (P11)

Experiences like P11's exemplifies a dilemma—she either had to keep seeing the upsetting pictures, or she could untag herself and strain her relationships with family members. While features like untagging and unfriending may allow people to shield themselves from upsetting content, our participants' experiences illustrated that these features are loaded with complex social meanings and negative consequences when put into practice.

## 4.2 Interpreting the Cause of the Encounters

Across the range of upsetting encounters that participants shared with us, we saw how different features and different social connections, either directly or indirectly contributed to the upsetting encounters. Participants had varied interpretations of these complex encounters, even describing their own "folk theories" about why certain content had appeared where it did. As participants described their encounters and their understandings of why they occurred, they tended to assign fault to three different parties—algorithms, themselves, and other people.

**4.2.1 It's the Algorithm's Fault.** Our participants had upsetting algorithmic encounters throughout Facebook, and as a result, the majority held "Facebook" as a platform responsible. But even as they explained that Facebook played a role in making the upsetting content appear, they shared confusion over why and how Facebook would choose to do so:

I clicked Facebook and the top, the very top item of my News Feed is "so and so is in a relationship with someone else," and I'm like, "Why are you putting that at the top of my feed?" (P09)

While P09 wondered why Facebook prioritized the upsetting content for her, only realizing the role of the algorithm in her experience long after the encounter, P10 was quick to blame Facebook for not doing what he perceived as the easy task of not showing content that would upset him:

I'm not posting any more pictures of [my ex-girlfriend], or tagging her in things... This algorithm that caters an ad to something that you searched on Google one time, why can't they realize that I haven't interacted with this person online in almost two years? Why are the memories of this person still popping up? I feel like it's careless ... like throwing things at you that you don't want to see anymore. (P10)

Participants like P10 described algorithms as powerful entities that could recognize upsetting content, but neglected to do their job. Participants' expectations of Facebook echo previous work that found people trusted and perceived Facebook as a "quasi-person" that can make decisions with some level of consciousness of the social outcomes [39]. This personification of Facebook allowed participants to blame the platform for things that seemed out of their control.

**4.2.2 It's My Own Fault.** While most participants blamed the algorithms, some participants blamed themselves for upsetting encounters. Participants like P12 faulted their management of account settings, even as they detailed the exhaustive ways they changed these settings and removed content from the platform:

I tried to go through my Facebook and delete everything that kind of reminded me of her, but obviously there's so much shit out there [laughing] that you know, it's hard to go through it all. So I mean there are things ... [that] slip through or whatever. (P12)

Facebook is a complex system. Despite our participants' best efforts, remnants of connections to their exes persisted. However, when people blamed themselves, we saw how these encounters eroded their confidence in how to use the platform. P06, who described herself as "tech-savvy," described her intense frustration, as well as a sense of personal failure and helplessness:

I feel like I know how to manage my identity on Facebook, and delete the things I don't want to be there. And this felt like a failure on my part... I remember thinking, "Am I never going to be free of all this crap online?" (P06)

When participants' had upsetting encounters despite actions they had taken to avoid them, their frustration included both doubt in their ability to manage the platform and a sense of resignation. Introducing doubt, however, is an unwanted consequence of curation algorithms that, in theory, aim to help people process the large amounts of information available to them on their social media sites. Participants like P06 told us they were not confident in their abilities to use available settings to potentially prevent future upsetting encounters. This reduced confidence may mean that, even if features for relationship dissolution are improved in the future, these participants may still lack the confidence to try to make any new settings work as they would want.

**4.2.3 It's Other People's Fault.** Finally, in some cases, participants specifically identified other people's behavior as the cause of their upsetting encounters. Participants described how the actions taken by their exes or someone connected to their exes could result in encounters with upsetting content.

Assigning fault to others was particularly common when participants described upsetting content they saw in News Feed. For example, P07 described how a benign behavior—in her case, her ex commenting on a photo her ex's new girlfriend was tagged in—resulted in an upsetting encounter with her ex-girlfriend's online presence. The presence of content in the News Feed is often visibly attributed to specific users and their behavior, as in "Your friend liked this post." So, understandably, that participants would assign responsibility to others even when they understand that the algorithm also plays a role. In the case of P07, she knew that there was an algorithm that could be "triggered" by human actions, but the human actor still shared part of the responsibility. P11 also focused on how algorithmic outcomes were the result of human actions, describing her ex-husband as ultimately responsible for her encounters:

[Photos of my ex-husband] are on [my stepmom's] page ... so it's still like right there whenever you go to her page... He was like "You need to delete all my friends and family from your Facebook." So I did. And yet he didn't delete [my friends]. I had asked him [to do] the same, and he did not. (P11)

Blocking ex-partners and unfriending mutual connections were common strategies participants used to mitigate unexpected encounters, but P11's frustration highlights two important issues. First, *people* have to take specific actions to avoid these encounters, and second, that others—including their ex-partners—have to take the same actions. Participants assigned fault to others when there were no clear delineations between the former couple's social networks. P13, for example, was cognizant of her family's continued interactions with her ex, and turned to social, rather than technical, options to mitigate encounters with upsetting content:

I had to just go out and reach out to my family and say "Can you guys stop liking [ex-husband's name]'s pictures?" (P13)

Even when participants were familiar with the capabilities of curation algorithms, they still attributed fault to other people. While these participants may have wanted to blame their ex-partners because of persisting negative emotions, our analysis suggests that these participants may

have simply assigned fault to sources that they understood and felt they could influence, such as tangible people in their lives.

In all three different interpretations of upsetting algorithmic encounters participants turned to in assigning fault, participants reached the same conclusion: someone or something was responsible for the upsetting encounter, be it the algorithm, themselves, or other people. However, *where* they assigned fault shaped how they understood the encounter, how they approached mitigating future encounters, and the expectations they placed on others or themselves. Yet participants were often unclear about how effective their attempts would ultimately be in eliminating upsetting encounters. Moreover, participants were at times unwilling to take the necessary steps they felt would solve their problems—specifically the act of unfriending—due to the rich social meaning that Facebook friendships carry.

#### 4.3 To Unfriend or Not to Unfriend

Facebook provides settings like Unfriend and Block which users can leverage to tailor their experiences on the platform and avoid upsetting algorithmic encounters. While some participants chose to break digital ties with their ex-partners to move on after the breakup, others were reluctant to sever connections.

Participants who wanted to break ties with their ex-partners often chose to block them on Facebook, which completely restricts access and visibility on both parties of the relationship [3]. Participants who initiated the blocking demonstrated they no longer wanted a connection of any kind with their ex-partners. For example, P14 blocked his ex-wife, and by doing so he assumed his ex-wife blocked him as well:

I've tried to avoid being reminded of being married to that person, and so ... we've blocked each other on Facebook, we've actively gone out of our way, well for me I've actively gone out of my way to avoid seeing posts from my ex-wife. (P14)

Participants like P15 blocked their ex-partners to physically or emotionally protect themselves or loved ones from their ex-partner:

[Blocking] is for my safety. I was blocking these people because I didn't want them to know about my private life, and I didn't want them to know exactly what I was doing, and I was trying to keep my daughter kind of protected and sheltered during the time too. (P15)

After what was described as an unhealthy marriage, P15 found blocking to be an effective method of avoiding unwanted interactions with her ex-husband. While the stories of P14 and P15 showed that blocking does help people avoid upsetting algorithmic encounters, only 4 of our 19 participants actively used the Unfriend or Block features on Facebook. Meanwhile, 7 participants reported they remained Facebook friends with their exes after a breakup occurred. Participants shared a variety of reasons for maintaining an online connection to an ex. This phenomenon illustrates that while blocking or unfriending an ex may seem straightforward, such technical acts are loaded with rich, complex social meanings. For example, P04 said that immediate unfriending would make the situation difficult if he wanted to remain friends with his ex-girlfriend in the future:

It hurts at first, but in the end, like, there's a reason you're attracted to each other. Maybe you're not meant to be in a relationship. In that way, you can still be friends, you know ... if you can just ignore it for a while, and you know, time heals all wounds... But if it goes, we break up and I unfriend her immediately and then 6 months later ... we're friends again and go through the friending thing and [that would be difficult]. (P04)

Similarly, P09 explained how unfriending was an action that leaves no future opportunities for friendship:

[Unfriending] kind of makes things permanent. Such a strong action. Like you're going from just "let's move on" and just kind of leave the door open and someday we could be friends and do this, to all-out "goodbye," like "You're gone. The end. We're not friends anymore." It's kind of ... permanent, because even if you think social media, "oh it's just nothing" [but] it does mean stuff to people even when you don't think it does. (P09)

Other participants echoed P09's sentiment: they were reluctant to completely sever ties with an ex because the nature of the relationship in its post-breakup phase was still meaningful and valuable enough to maintain a Facebook friendship. For example, P07 did not unfriend or block their ex, even though they were no longer romantically involved:

If you like somebody enough to date them, you probably like them enough to not want to delete them from your life immediately. (P07)

P07 did not say "delete them from *Facebook*." Her word choice demonstrates how Facebook friendships are not confined to the online platform, but represent important parts of people's whole lives. P03 felt the same when, in the course of the interview, he found out that he could block specific people in *On This Day*, but was hesitant to do so:

Now that I have that ability, I'm questioning if I want that. I think I do. And now it's just a matter of deciding when to effectively erase 13 years of my life... She was a huge part of my life, and occasionally there are good memories... So I guess that's a thought I have like "Oh if I block any memories having to do with her, what else am I losing?" (P03)

For P03, blocking was not only emotionally unbearable, but practically unfeasible:

Even if I don't want it, I can't block the entire [social network]... Like do I block her friends from high school that I'm friends with on Facebook? Do I block her aunt and uncle that I like? Like where does it stop? (P03)

P03 explained that the extended social network resulting from his marriage made it impossible to avoid Facebook content about his ex-wife. Beyond blocking or unfriending of an individual, the social connections that surrounded participants' relationships caused a range of difficulties in the aftermath of their breakups, which we discuss in the next section.

#### 4.4 The Curse of the Social Periphery

Though participants could unfriend or block their ex-partners, participants felt it was not practical, feasible, or always appropriate to disconnect with every shared friend, group, or interest — to say nothing of tagged photos and posts. Participants described myriad connections that, while peripheral to their daily lives, persisted online. We refer to these social connections as the "social periphery" — distant, unimportant, or unexpected social connections that might have been desirable had that romantic relationship persisted, yet remained online after the breakup as part of the data on which algorithms act.

In the previous section, we discussed upsetting encounters with content about or from an ex-partner as a result of a shared social network. But this network of extended social relationships caused participants difficulty after the breakup, beyond direct encounters with an ex-partner's content.

For example, P19 shared her distress at regularly encountering Facebook posts about her ex-mother-in-law's blog, which heavily featured P19's ex-husband:

[My ex-mother-in-law] also blogs about daily life. *Every. Day.* For years. I mean I was just like, "Oh, my goodness." When I just clicked on it once, just like, "Who is this person? Why does his name pop up?" And it popped up and went, "Oh, my God. This is his daily existence"… Down to blogging about [my ex-husband and his current wife's] wedding and everything. (P19)

After this first experience, P19 was able to subsequently avoid following the links to her ex-mother-in-law's blog. In contrast, P07 did not have a choice because her ex-partner's family member was actively engaging with her as a result of the sustained connections with their shared social network:

[My ex-girlfriend's mom] is just always on my feed, liking my posts… It's just a very weird place to navigate because I don't know if I should say something, or not, or like, stay in touch with them. What do you do? (P07)

P07's sustained connection with her ex-girlfriend's mother made her reflect on whether digital ties with her ex-girlfriend's family should be severed, and therefore decisions about the appropriate actions became unclear:

'Cause we formed meaningful connections with these people, and now they're just faces on a Facebook page, you know, then you start with a picture that goes by, and, then you have to ask yourself: Do you like this post? How do you like this post? Is that weird? Is that okay? (P07)

Social peripheries can be a problem during breakups as well, especially if the relationship was "Facebook official." Shortly after P04 went "Facebook official" with his girlfriend, she broke up with him, and he was worried that his public image would suffer as a result:

So, I had posted [the relationship on Facebook]. People started liking it… And she's like, "I need to talk to you about some things." And that's when I went, alright well, I'm gonna take [the in-a-relationship status] down now before anyone else sees it. (P04)

P04 was furious, stating that his anger came not only from the sudden, unexpected breakup but also from the obligation of explaining to his friends why he was suddenly single again:

I feel like that it's total garbage that … anyone could change their relationship status… Like put a relationship with somebody, and then it just goes public without the other person verifying that… I'm confused and now I'm like well, son of a bitch, I've got my friends like "Whoa what happened?" And now I gotta explain something that I don't understand either, right? (P04)

P04's experience highlights an unexpected but serious consequence of News Feed's semi-public nature: while users might think of relationship status as a simple setting to change, the system broadcasts the setting change to both people's social networks as a semi-public announcement of the relationship. The announcement can cause a person embarrassment, or cause friends, family, and other peripheral social connections to ask questions that the person would rather remain unasked.

In the examples above, Facebook's curation algorithm surfaced distressing content to our participants despite their attempts to create digital distance. Because romantic relationships are most easily operationalized as one-to-one connections, it appears that algorithms often prioritized these one-to-one connections over peripheral social connections that arose around those romantic relationships. As our analysis shows, ignoring the complicated ways exes remain connected through the social periphery can lead to upsetting encounters with Facebook content.

Social peripheries were not limited to direct social connections like posts about other people in News Feed; our participants' encounters extended to online spaces where people interact, like

comments. Posts related to an ex-partner emerged from other people in the ex-partner's social network, which complicated decisions about unfriending these people. Additionally, shared spaces such as events and groups all made it difficult to completely remove an ex-partner from one's social media. Across all of these instances, such dense and evolving ties present designers with exceptional challenges. If, as we have shown, people struggle to manage their former relationships online, let alone the residual connections that may remain after a breakup, it may be unreasonable to expect algorithmic recommendations to be more sensitive without any clear signals. Designers may need to accept this ambiguity and consider more than just the data and metrics with which they design their algorithms. We discuss these challenges and considerations below.

## 5 DISCUSSION

Curation algorithms show content based on a computational determination of what content people likely want to see. But our participants' stories describe instances of these algorithms not recognizing crucial social contexts that may make content upsetting. Some participants encountered upsetting content about their ex-partners directly through features like News Feed and On This Day, while others were bothered by content flowing through the residual and inferred connections that still exist in these online spaces.

Usability literature often focuses on making technology easy to use and reducing users' mental labor. Principles like "Don't make me think" are common (e.g., [38]). Social media platforms treat features that break social ties with the same consideration as many other settings, utilizing one-click workflows to unfriend, unfollow, or block. Our participants, however, thought carefully—even struggled—about whether and when to use these features, which suggests that the "don't make me think" mantra ignores reality: technical features are loaded with social consequences. We highlight the mismatch between user considerations and design considerations as a tension between human interpretations and system implementations of certain actions. To resolve this tension between human and system, systems need to provide clearer explanations about how a particular setting will change users' visible connections to the other person on Facebook, such as how much they will now see of the person, what happens to tagged photos and posts, or what that person will see of them. Designers should also clarify how Facebook will represent users' decisions to their network when they use relationship management features.

It is possible that clearer documentation and workflows would benefit people trying to manage what content is curated for them in their content streams. Such changes might have mitigated several of our participants' experiences, such as P03 who only learned about Facebook's Take a Break feature during his interview. But such low-level fixes would fail to consider some of the underlying issues that can help us understand *why* upsetting encounters with curated content occur in the first place. We turn our attention to these issues by first discussing how Facebook algorithms are designed to prioritize connecting people without adequate regard for the pain that these connections might cause. Next, we discuss how misrepresentations of social peripheries can result in upsetting algorithmic encounters and how designers can better the unexpected connections algorithms make. Building on this analysis, we highlight the tension between current computational representations of relationships and how those relationships are practiced in real life. We argue that as a result of the connections curation algorithms make through a variety of trace data, designers need to consider more than just the explicit connections—like relationships—in data. Designers need to consider inferred connections as well.

### 5.1 The Painful Connections

Our participants encountered content curated by algorithms from people with whom they no longer wanted to be connected. While curation algorithms on social media are designed to prioritize

connecting people and showing them meaningful information, these algorithms are only provided simplistic representations of people's complex social relationships [6, 10, 36, 57], consequently making connections with people and content that are painful. But modeling relationships between people is deceptively nuanced.

It would be easy to operationalize "close" based on whether two people are "friends" or not because friending on SNSs represents a binary measure of connection - either you are friends and connected, or you are not. However, in line with prior research [13, 41], we found participants rarely unfriended their ex-partners on Facebook. Our participants commonly maintained friendships and preserved shared content as a way of respecting their past. This does not mean they actively wanted to be reminded of the past. Our participants' decisions to remain connected ("friends") after breaking up illustrate the fallacy of relying only on a binary representation of connection when considering closeness. In systems that are built to connect people, create communities, and encourage engagement, reliance on connected or not when suggesting content to interact with (or new people to connect to) might work well. However, in the context of a breakup, leaving the relationship in the past may be a more desirable action than forcibly rekindling it, making suggestions around content involving an ex undesirable and inappropriate and rendering reliance on the friending metric for content suggestion untenable.

Another common way of operationalizing "close" is to use the tie strength between two people, a concept originally defined by Granovetter as, "...a (probably linear) combination of the amount of time, the emotional intensity, the intimacy (mutual confiding), and the reciprocal services which characterize the tie" [28]. By all of these metrics, the tie existing between two ex-lovers could be considered strong, even after a breakup. But, maybe according to social norms, they do not want to be strongly connected anymore.

In practice, tie strength has been represented in simple proxies within our social networking systems: communication reciprocity, existence of mutual friends, recency of communication, and interaction frequency (e.g., [25, 27, 43, 61]). While researchers have used these dimensions to predict tie strength on social media [27], these predictions prove to be inaccurate when it comes to situations with complex or nuanced social contexts. Facebook certainly uses these forms of tie strength when ranking content. However, in many cases, designers may be using these algorithms to encourage closer ties, establishing new ties (e.g., as with People You May Know), and promote content, resulting in many of the encounters shared with us here. The failure to understand the broader context around tie strength in complex scenarios suggests that algorithmic approaches to determining tie strength in the context of a breakup might be unreliable. As Gilbert & Karahalios [27] argued, "a model may never, and perhaps should never, predict relationships...[that] have powerful emotions and histories at play."

Of course, connections exist with more than just people. Limiting our attention to social relationships and interpersonal tie-strength overlooks a key challenge when our social lives are captured and produced through data. While our participants focused on interpersonal relationships in this study, it is not hard to see how many of their painful connections were the result of more than just explicitly declared relationship statuses and friendships. Events, interests, photos, groups, and status updates all create an enmeshed network of connections across which algorithms infer relationships and promote content. In the wake of a breakup, socially peripheral connections like these can create opportunities for upsetting encounters, which we present examples of in Figure 1. Designs that seek to address the influence of the social periphery cannot be limited strictly to handling relationships—they must also consider the myriad of other ways that social peripheries are [mis]represented in our data systems.

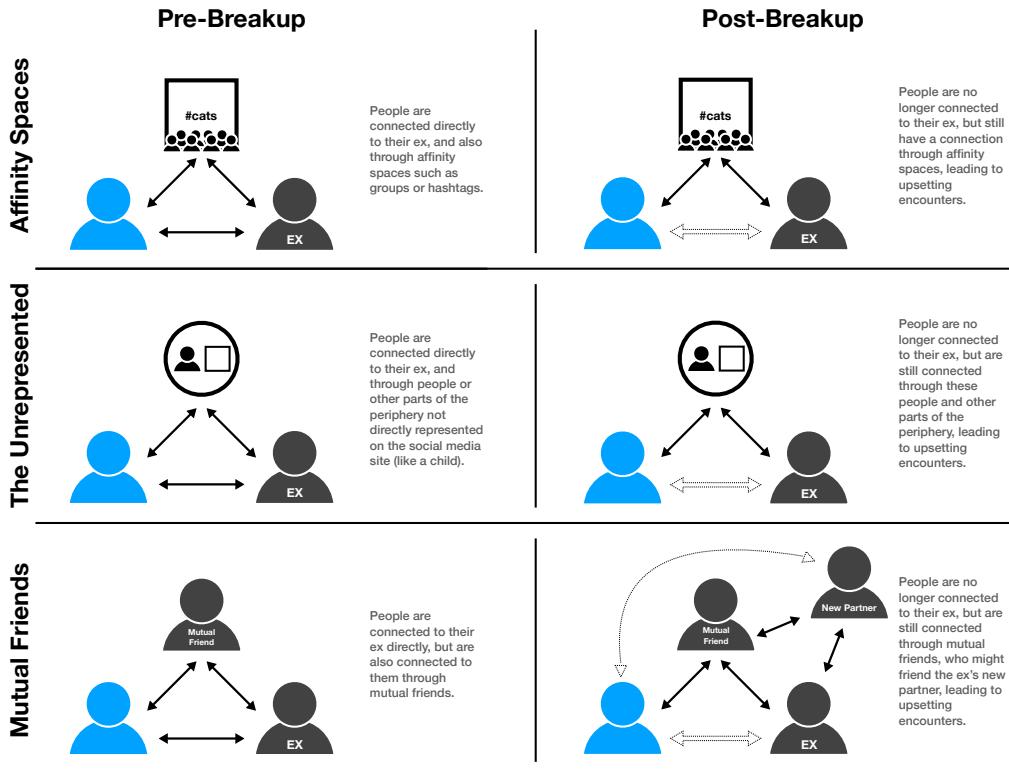


Fig. 1. Examples of social peripheries as represented in social media sites.

Solid lines indicate connections, while dotted lines indicate connections that might arise because of the periphery (e.g., a person might see content pertaining to or containing their ex because of the periphery).

## 5.2 Designing for the Social Periphery

In many cases, participants had upsetting encounters as a result of their relationships that were represented in the periphery—the various individuals who are socially connected because of the relationship, but not in the relationship itself. Our findings suggest that current relationship management features handle the connections that comprise the social periphery poorly. After a breakup, the features that exist on social media platforms focus on the two people in the former relationship and do not account for their overlapping social network or the nuanced ways that their content and actions might result in an upsetting encounter for the ex-partners. For example, individuals might disconnect from their ex (although our participants struggled with this and many did not), but they are less likely to disconnect from their former mother-in-law, which might lead to upsetting encounters. In Figure 2, we show how representing a socially peripheral connection such as an ex-mother-in-law can lead to upsetting encounters. The system's focus on individuals and 1:1 connections leaves room for the upsetting encounters that our participants experienced when they saw ex-partners in shared spaces or had to deal with unclear social norms around whether to unfriend.

Algorithms need to be designed in ways that operationalize peripheries—and perhaps already do unintentionally—but this raises questions about what types of connections should impact algorithmic decisions: How far into one's social network should algorithms reach when making

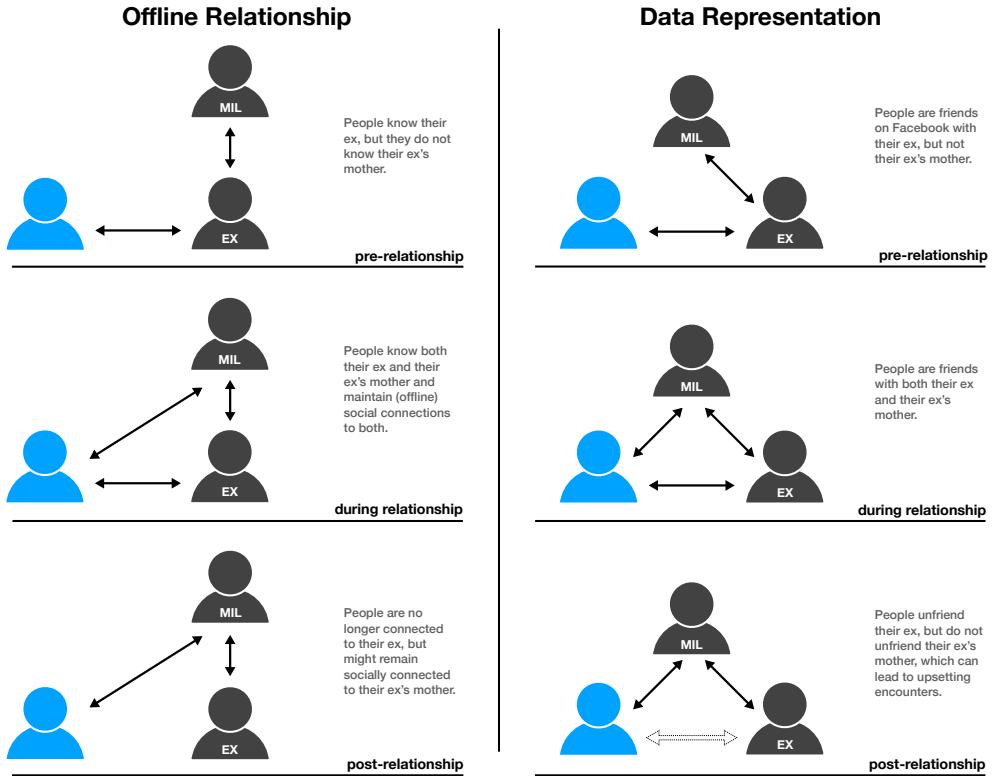


Fig. 2. How the connection to a mother-in-law (MIL) changes over the course of a relationship and its dissolution, creating the chance of upsetting encounters.

Solid lines indicate connections, while dotted lines indicate connections that might arise because of the periphery (e.g., a person might see content pertaining to or containing their ex because of the periphery).

decisions about content? And how should the relationships with the periphery be weighed in relationship to content such as affinity spaces or events? We argue that designers should carefully consider these questions, and caution against addressing them with black-and-white solutions such as mass-blocking [41]. Approaching the problem in an overly simplistic manner might prevent interactions that people *would* value, as the context they appear in may still be meaningful. Consider the example of a Facebook Event for a theatrical play starring a mutual friend. Obviously it would be inappropriate for the event to be promoted based on one's ex-partner receiving an invite or responding to an invite. Similarly, it would be inappropriate to promote the event based on the ex's new partner's RSVP. But what behavior of an ex should result in the event being omitted or even hidden?

Designers might consider algorithmically detecting potentially upsetting encounters and redesigning *how* those encounters occur. In our example of a Facebook event, designers could consider when and how to make an ex-partner visible. Invite and RSVP lists may be more or less useful depending on the size of the venue or if the "event" spans multiple days. When upsetting encounters are unavoidable, designers should also consider how to make these encounters less jarring. Designers might consider progressive disclosure strategies, foregrounding logistical information while requiring people to actively look at an RSVP list. Factors like the size of the event (i.e., how

many people are attending?) and the ex-partner's RSVP (i.e., are they likely to attend?) could both help designers consider what information should be made more or less prominent. Ultimately, however, there are trade-offs to be considered between what might be an upsetting encounter online and a possibly more upsetting encounter in person.

While these recommendations might help address issues around a single feature, our analysis also points to underlying design challenges caused by the uncertainty and unpredictability of content recommended by algorithms across any number of features. At issue here is how connections between people and between data points fuel recommendations across the platform. Complicating the issue are the types of signals that algorithms are optimized to measure and act on. While romantic breakups present a understandable human experience for designers to address, the signals around which algorithms optimize—like interaction frequency and clicks—are much harder for designers to conceptualize when outcomes are harder to predict. Because algorithms leverage connections in ways that designers cannot always anticipate, algorithms may produce suggestions and content that are at odds with the objectives of other features intended to shield people from upsetting encounters (i.e., Take a Break). Designers might start by taking a step back and cataloging all the types of connections that might cause these encounters—both those that result from intentional system design as well as those that emerge out of algorithmic connections occurring based on the broad social network. Until designers have a more holistic understanding of what types of connections draw people together, upsetting encounters will continue to occur.

### 5.3 Representation and Its Consequences

Our participants' difficulties with peripheral social connections highlight the gap between human and computational understandings of the world—social relationships are not settings; they are performed and practiced. At issue here is 1) the social contexts that systems cannot computationally represent, and 2) the computational representations that people may not understand or expect.

When an algorithm evaluates content and relationships to make recommendations, experiences are reduced into signals (for example, either one is or is not in a relationship). Such reduction is required for algorithms to parse and aggregate, but this reduction omits the deep, lived experience of everyone involved, including those in the periphery of the romantic relationship. Designers must make choices about what to include and what to exclude from any particular representation [4]. As Agre argues, “a computer can only capture and calculate with what it can represent” [ibid.]. Agre's argument is more true when considering the signals on which algorithms operate. As Hacking [29] claimed, all categories of data come “under a description,” a point echoed by Bowker [8] when he states that “data comes in a dizzying set of categorical bins. You always have to know some context.” The work presented here demonstrates the complexity of appropriately understanding context, as well as the risks offloaded from algorithm to users when context is not available. Many of our participants were prompted to revisit their management capabilities after an upsetting encounter. This left them attempting to navigate unclear granular settings amid an emotional reaction to content they never wanted to see. The availability of settings cannot fully protect people from encountering undesirable content in the first place.

Social peripheries allow us to consider how tenuous and invisible connections can result in reoccurring and painful encounters. While curation algorithms are designed to personalize content to a specific user, their designs optimize around specific metrics rather than taking a holistic perspective. The results are surprising encounters that people recognize as inappropriate. In the case of romantic breakups, features such as Take A Break are easy to conceptualize and design when relationships are conceptualized as one-to-one (through features such as “Relationship Status” on Facebook). If you disconnect the two ex-partners so that they cannot see each other, then the problem of upsetting encounters with their content goes away. Removing the ex from curated

content is similarly straightforward. However, focusing on just the relationship ignores peripheral social connections, which might inadvertently expose one partner to content about an ex when the system does not adequately consider the context that surrounds a post. For example, posts by an ex may be filtered out, but an ex-partner may not be tagged in a photo posted by a mutual friend, and so the system does not filter the photo out of one's stream, leading to an upsetting encounter. Thus, to create algorithmic systems that are more sensitive in their recommendations to the needs of people, we must re-conceptualize how individuals and relationships are represented in these systems, what types of relationships are worth accounting for, and what goals we include and prioritize in the design of our algorithms.

Finally, while we have focused on the social peripheries of romantic relationships, the diversity of connections that constitute a broader "data periphery" needs to be more explicitly considered. The latent connections in the data we generate through social media produce a new context that designers should attend to when considering how best to support people following a breakup. We have moved past the point of asking "Who gets which friend?" Given the variety of connections that algorithms leverage and that might draw exes back together, we might need to also ask "Which photo? Which status? Which like?" When viewed as data, peripheries present a new context full of tenuous connections that are not readily apparent to humans but are easily recognizable by algorithms. Accounting for this new context is the next challenge for designers who work with algorithms that leverage these data in order to create interactions that are sensitive to our lived experiences both offline and online.

## 6 CONCLUSION

As the work of content curation on social media continues to shift from people to algorithms, understanding how people experience what those algorithms make visible is critical to the design of human-centered systems—especially when the results are upsetting or harmful. Through the lens of breakups, this study examined scenarios where people unexpectedly encountered upsetting algorithmically curated content about their ex-partners on Facebook. We found these encounters happened in various places on the platform and were caused when curation algorithms could not account for people's complex social contexts. This work contributes a deeper understanding of the risks and consequences of algorithms that prioritize connecting people without accounting for their social contexts, and design implications for representing relationships on social platforms.

Designing algorithms that are sensitive to our social lives may remain a persistent challenge. Algorithms, whether optimizing our search results or ranking content in our social media feeds, are limited by the features and data made available to them. However, social media content derives its value from the social context in which that content is situated—context that may not be available to the system or understandable to an algorithm. Our findings point to areas where algorithms can be improved, notably when it comes to accounting for the social peripheries around romantic relationships. We argue that system designers cannot afford to abdicate the responsibility of algorithmically curated aspects of their systems to data models and back-end code, and that they should consider the difference between how human relationships are computationally represented and how they are practiced in real life.

## ACKNOWLEDGMENTS

The authors would like to thank Blake Hallinan, Brianna Dym, Casey Fiesler, Josh McCann, Melissa Bica, Chris Bopp, Laura Devendorf, and Arcadia Zhang for their suggestions which helped improve this paper. All authors thank the final author for the class this project came from. We would also like to thank P06 for the title of this paper. Finally, we each would like to thank our exes for their

contributions to our ability to empathize with our participants' experiences. With that being said, **thank u, next.**

This work was supported in part by the National Science Foundation #1042678.

## REFERENCES

- [1] [n. d.]. Facebook News Feed. <https://newsfeed.fb.com/>
- [2] [n. d.]. My romantic relationship ended. What can I do? | Facebook Help Center | Facebook. [https://www.facebook.com/help/535048496658903?helpref=uf\\_permalink](https://www.facebook.com/help/535048496658903?helpref=uf_permalink)
- [3] [n. d.]. Unfriending or Blocking Someone | Facebook Help Center | Facebook. <https://www.facebook.com/help/1000976436606344>
- [4] Philip E. Agre. 1997. Beyond the mirror world: privacy and the representational practices of computing. In *Technology and Privacy*, Philip E. Agre and Marc Rotenberg (Eds.). MIT Press, Cambridge, MA, USA, 29–61. <http://dl.acm.org/citation.cfm?id=275283.275285>
- [5] Cecilia Aragon, Clayton Hutto, Andy Echenique, Brittany Fiore-Gartland, Yun Huang, Jinyoung Kim, Gina Neff, Wanli Xing, and Joseph Bayer. 2016. Developing a Research Agenda for Human-Centered Data Science. In *Proceedings of the 19th ACM Conference on Computer Supported Cooperative Work and Social Computing Companion (CSCW '16 Companion)*. ACM, New York, NY, USA, 529–535. <https://doi.org/10.1145/2818052.2855518>
- [6] Eric P. S. Baumer and Jed R. Brubaker. 2017. Post-userism. In *Proceedings of the 2017 CHI Conference on Human Factors in Computing Systems (CHI '17)*. ACM, New York, NY, USA, 6291–6303. <https://doi.org/10.1145/3025453.3025740>
- [7] Paul Bohannan. 1970. *Divorce and after*. Doubleday, New York, New York.
- [8] Geoffrey C. Bowker. 2005. *Memory Practices in the Sciences*. MIT Press, Cambridge, Massachusetts.
- [9] Virginia Braun and Victoria Clarke. 2006. Using thematic analysis in psychology. *Qualitative Research in Psychology* 3, 2 (Jan. 2006), 77–101. <https://doi.org/10.1191/1478088706qp063oa>
- [10] Jed R. Brubaker and Gillian R. Hayes. 2011. SELECT \* FROM USER: infrastructure and socio-technical representation. In *Proceedings of the ACM 2011 conference on Computer supported cooperative work - CSCW '11*. ACM Press, New York, New York, USA, 369–378. <https://doi.org/10.1145/1958824.1958881>
- [11] Moira Burke and Robert E. Kraut. 2014. Growing closer on facebook: changes in tie strength through social network site use. In *Proceedings of the SIGCHI Conference on Human Factors in Computing systems*. ACM, ACM, Toronto, Canada, 4187–4196.
- [12] Jenna Burrell. 2016. How the machine 'thinks': Understanding opacity in machine learning algorithms. *Big Data & Society* 3, 1 (June 2016), 2053951715622512. <https://doi.org/10.1177/2053951715622512>
- [13] Briahna Bigelow Bushman and Julianne Holt-Lunstad. 2009. Understanding Social Relationship Maintenance Among Friends: Why We Don't End Those Frustrating Friendships. *Journal of Social and Clinical Psychology* 28, 6 (June 2009), 749–778. <https://doi.org/10.1521/jscp.2009.28.6.749>
- [14] Kelly Caine. 2016. Local standards for sample size at CHI. In *Proceedings of the 2016 CHI Conference on Human Factors in Computing Systems*. ACM, ACM, San Jose, CA, 981–992.
- [15] Michael A. DeVito, Jeremy Birnholtz, Jeffery T. Hancock, Megan French, and Sunny Liu. 2018. How People Form Folk Theories of Social Media Feeds and What It Means for How We Study Self-Presentation. In *Proceedings of the 2018 CHI Conference on Human Factors in Computing Systems (CHI '18)*. ACM, New York, NY, USA, 120:1–120:12. <https://doi.org/10.1145/3173574.3173694>
- [16] Nicholas Diakopoulos. 2014. Algorithmic Accountability Reporting: On the Investigation of Black Boxes. *Columbia Journalism School* (2014). <https://doi.org/10.7916/D8ZK5TW2>
- [17] Steve Duck. 1982. A topography of relationship disengagement and dissolution. *Personal relationships* 4 (1982), 1–30.
- [18] Lydia F. Emery, Amy Muise, Elizabeth Alpert, and Benjamin Le. 2015. Do we look happy? Perceptions of romantic relationship quality on Facebook. *Personal Relationships* 22, 1 (March 2015), 1–7. <https://doi.org/10.1111/pere.12059>
- [19] Motahhare Eslami, Karrie Karahalios, Christian Sandvig, Kristen Vaccaro, Aimee Rickman, Kevin Hamilton, and Alex Kirlik. 2016. First I "Like" It, then I Hide It: Folk Theories of Social Feeds. In *Proceedings of the 2016 CHI Conference on Human Factors in Computing Systems (CHI '16)*. ACM, New York, NY, USA, 2371–2382. <https://doi.org/10.1145/2858036.2858494>
- [20] Motahhare Eslami, Aimee Rickman, Kristen Vaccaro, Amirhossein Aleyasen, Andy Vuong, Karrie Karahalios, Kevin Hamilton, and Christian Sandvig. 2015. "I Always Assumed That I Wasn't Really That Close to [Her]": Reasoning About Invisible Algorithms in News Feeds. In *Proceedings of the 33rd Annual ACM Conference on Human Factors in Computing Systems (CHI '15)*. ACM, New York, NY, USA, 153–162. <https://doi.org/10.1145/2702123.2702556>
- [21] Michael Feldman, Sorelle A. Friedler, John Moeller, Carlos Scheidegger, and Suresh Venkatasubramanian. 2015. Certifying and Removing Disparate Impact. In *Proceedings of the 21th ACM SIGKDD International Conference on Knowledge Discovery and Data Mining (KDD '15)*. ACM, New York, NY, USA, 259–268. <https://doi.org/10.1145/2783258.2783311>

[22] Jesse Fox, Jeremy L. Osborn, and Katie M. Warber. 2014. Relational dialectics and social networking sites: The role of Facebook in romantic relationship escalation, maintenance, conflict, and dissolution. *Computers in Human Behavior* 35 (2014), 527–534.

[23] Jesse Fox and Katie M. Warber. 2012. Romantic Relationship Development in the Age of Facebook: An Exploratory Study of Emerging Adults' Perceptions, Motives, and Behaviors. *Cyberpsychology, Behavior, and Social Networking* 16, 1 (Oct. 2012), 3–7. <https://doi.org/10.1089/cyber.2012.0288>

[24] Jesse Fox, Katie M. Warber, and Dana C. Makstaller. 2013. The role of Facebook in romantic relationship development: An exploration of Knapp's relational stage model. *Journal of Social and Personal Relationships* 30, 6 (Sept. 2013), 771–794. <https://doi.org/10.1177/0265407512468370>

[25] Noah Friedkin. 1980. A test of structural features of granovetter's strength of weak ties theory. *Social Networks* 2, 4 (Jan. 1980), 411–422. [https://doi.org/10.1016/0378-8733\(80\)90006-4](https://doi.org/10.1016/0378-8733(80)90006-4)

[26] Oscar H. Gandy. 2010. Engaging rational discrimination: exploring reasons for placing regulatory constraints on decision support systems. *Ethics and Information Technology* 12, 1 (March 2010), 29–42. <https://doi.org/10.1007/s10676-009-9198-6>

[27] Eric Gilbert and Karrie Karahalios. 2009. Predicting Tie Strength with Social Media. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems (CHI '09)*. ACM, New York, NY, USA, 211–220. <https://doi.org/10.1145/1518701.1518736>

[28] Mark S. Granovetter. 1973. The Strength of Weak Ties. *Amer. J. Sociology* 78, 6 (May 1973), 1360–1380. <https://doi.org/10.1086/225469>

[29] Ian Hacking. 1995. *Rewriting the Soul: Multiple Personality and the Sciences of Memory*. Princeton University Press, Princeton, New Jersey. <https://www.jstor.org/stable/j.ctt7rr17>

[30] Oliver L. Haimson, Nazanin Andalibi, Munmun De Choudhury, and Gillian R. Hayes. 2018. Relationship breakup disclosures and media ideologies on Facebook. *New Media & Society* 20, 5 (May 2018), 1931–1952. <https://doi.org/10.1177/1461444817711402>

[31] Caroline Haythornthwaite. 2002. Strong, weak, and latent ties and the impact of new media. *The Information Society* 18, 5 (2002), 385–401.

[32] Daniel Herron, Wendy Moncur, and Elise van den Hoven. 2017. Digital Decoupling and Disentangling: Towards Design for Romantic Break Up. In *Proceedings of the 2017 Conference on Designing Interactive Systems (DIS '17)*. ACM, New York, NY, USA, 1175–1185. <https://doi.org/10.1145/3064663.3064765>

[33] Oren Hod. 2018. All of Your Facebook Memories Are Now in One Place. <https://newsroom.fb.com/news/2018/06/all-of-your-facebook-memories-are-now-in-one-place/>

[34] Ellen Isaacs, Artie Konrad, Alan Walendowski, Thomas Lennig, Victoria Hollis, and Steve Whittaker. 2013. Echoes from the Past: How Technology Mediated Reflection Improves Well-being. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems (CHI '13)*. ACM, New York, NY, USA, 1071–1080. <https://doi.org/10.1145/2470654.2466137>

[35] Jialun "Aaron" Jiang and Jed R. Brubaker. 2018. Tending Unmarked Graves: Classification of Post-mortem Content on Social Media. *Proc. ACM Hum.-Comput. Interact.* 2, CSCW (2018), Article 81. <https://doi.org/10.1145/3274350>

[36] Benjamin Koehne, Matthew J. Bietz, and David Redmiles. 2013. Identity Design in Virtual Worlds. In *End-User Development (Lecture Notes in Computer Science)*, Yvonne Dittrich, Margaret Burnett, Anders Mørch, and David Redmiles (Eds.). Springer Berlin Heidelberg, Berlin, Germany, 56–71.

[37] Artie Konrad, Ellen Isaacs, and Steve Whittaker. 2016. Technology-Mediated Memory: Is Technology Altering Our Memories And Interfering With Well-Being? *ACM Trans. Comput.-Hum. Interact.* 23, 4 (Aug. 2016), 23:1–23:29. <https://doi.org/10.1145/2934667>

[38] Steve Krug. 2009. *Don't Make Me Think: A Common Sense Approach to Web Usability*. Pearson Education, New York, New York.

[39] Nancy K. Lankton and D. Harrison McKnight. 2011. What Does It Mean to Trust Facebook?: Examining Technology and Interpersonal Trust Beliefs. *SIGMIS Database* 42, 2 (May 2011), 32–54. <https://doi.org/10.1145/1989098.1989101>

[40] Lauren A. Lee and David A. Sbarra. 2013. The predictors and consequences of relationship dissolution: Breaking down silos. In *Human bonding: The science of affectional ties*. Guilford Press, New York, NY, US, 308–342.

[41] Leah LeFebvre, Kate Blackburn, and Nicholas Brody. 2015. Navigating romantic relationships on Facebook: Extending the relationship dissolution model to social networking environments. *Journal of Social and Personal Relationships* 32, 1 (2015), 78–98.

[42] Stephen J. Lepore and Melanie A. Greenberg. 2002. Mending Broken Hearts: Effects of Expressive Writing on Mood, Cognitive Processing, Social Adjustment and Health Following a Relationship Breakup. *Psychology & Health* 17, 5 (Jan. 2002), 547–560. <https://doi.org/10.1080/08870440290025768>

[43] Nan Lin, Paul W. Dayton, and Peter Greenwald. 1978. Analyzing the Instrumental Use of Relations in the Context of Social Structure. *Sociological Methods & Research* 7, 2 (Nov. 1978), 149–166. <https://doi.org/10.1177/004912417800700203>

[44] Alice E. Marwick and banah boyd. 2011. I tweet honestly, I tweet passionately: Twitter users, context collapse, and the imagined audience. *New Media & Society* 13, 1 (2011), 114–133.

[45] Dan P. McAdams, Jeffrey Reynolds, Martha Lewis, Allison H. Patten, and Phillip J. Bowman. 2001. When Bad Things Turn Good and Good Things Turn Bad: Sequences of Redemption and Contamination in Life Narrative and their Relation to Psychosocial Adaptation in Midlife Adults and in Students. *Personality and Social Psychology Bulletin* 27, 4 (April 2001), 474–485. <https://doi.org/10.1177/0146167201274008>

[46] Eric Meyer. 2014. Inadvertent Algorithmic Cruelty. <https://meyerweb.com/eric/thoughts/2014/12/24/inadvertent-algorithmic-cruelty/>

[47] Greg Bowe B. A. Mod. 2010. Reading Romance: The Impact Facebook Rituals Can Have On A Romantic Relationship. *Journal of Comparative Research in Anthropology and Sociology* 1, 2 (Oct. 2010), 61–77.

[48] Naomi P. Moller, Rachel T. Fouladi, Christopher J. McCarthy, and Katharine D. Hatch. 2003. Relationship of Attachment and Social Support to College Students' Adjustment Following a Relationship Breakup. *Journal of Counseling & Development* 81, 3 (2003), 354–369. <https://doi.org/10.1002/j.1556-6678.2003.tb00262.x>

[49] Wendy Moncur, Lorna Gibson, and Daniel Herron. 2016. The Role of Digital Technologies During Relationship Breakdowns. In *Proceedings of the 19th ACM Conference on Computer-Supported Cooperative Work & Social Computing (CSCW '16)*. ACM, New York, NY, USA, 371–382. <https://doi.org/10.1145/2818048.2819925>

[50] Arif Najib, Jeffrey P. Lorberbaum, Samet Kose, Daryl E. Bohning, and Mark S. George. 2004. Regional Brain Activity in Women Grieving a Romantic Relationship Breakup. *American Journal of Psychiatry* 161, 12 (Dec. 2004), 2245–2256. <https://doi.org/10.1176/appi.ajp.161.12.2245>

[51] Jennifer L. Pals. 2006. Constructing the "Springboard Effect": Causal Connections, Self-Making, and Growth Within the Life Story. In *Identity and story: Creating self in narrative*. American Psychological Association, Washington, DC, US, 175–199. <https://doi.org/10.1037/11414-008>

[52] Malcolm R. Parks. 2017. Embracing the challenges and opportunities of mixed-media relationships. *Human Communication Research* 43, 4 (2017), 505–517.

[53] Frank Pasquale. 2015. *The Black Box Society: The Secret Algorithms That Control Money and Information*. Harvard University Press, Cambridge, Massachusetts. <https://www.jstor.org/stable/j.ctt13x0hch>

[54] Emilee Rader. 2017. Examining user surprise as a symptom of algorithmic filtering. *International Journal of Human-Computer Studies* 98 (Feb. 2017), 72–88. <https://doi.org/10.1016/j.ijhcs.2016.10.005>

[55] Emilee Rader and Rebecca Gray. 2015. Understanding User Beliefs About Algorithmic Curation in the Facebook News Feed. In *Proceedings of the 33rd Annual ACM Conference on Human Factors in Computing Systems (CHI '15)*. ACM, New York, NY, USA, 173–182. <https://doi.org/10.1145/2702123.2702174> event-place: Seoul, Republic of Korea.

[56] Brady Robards and Siân Lincoln. 2016. Making It "Facebook Official": Reflecting on Romantic Relationships Through Sustained Facebook Use. *Social Media + Society* 2, 4 (Oct. 2016), 2056305116672890. <https://doi.org/10.1177/2056305116672890>

[57] Mattias Rost, Louise Barkhuus, Henriette Cramer, and Barry Brown. 2013. Representation and Communication: Challenges in Interpreting Large Social Media Datasets. In *Proceedings of the 2013 Conference on Computer Supported Cooperative Work (CSCW '13)*. ACM, New York, NY, USA, 357–362. <https://doi.org/10.1145/2441776.2441817>

[58] Johnny Saldaña. 2009. *The Coding Manual for Qualitative Researchers*. SAGE Publications, Thousand Oaks, California.

[59] Christian Sandvig, Kevin Hamilton, Karrie Karahalios, and Cedric Langbort. 2014. Auditing algorithms: Research methods for detecting discrimination on internet platforms. *Data and Discrimination: Converting Critical Concerns Into Productive Inquiry* (2014).

[60] Corina Sas and Steve Whittaker. 2013. Design for Forgetting: Disposing of Digital Possessions After a Breakup. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems (CHI '13)*. ACM, New York, NY, USA, 1823–1832. <https://doi.org/10.1145/2470654.2466241>

[61] Xiaolin Shi, Lada A. Adamic, and Martin J. Strauss. 2007. Networks of strong ties. *Physica A: Statistical Mechanics and its Applications* 378, 1 (May 2007), 33–47. <https://doi.org/10.1016/j.physa.2006.11.072> arXiv: cond-mat/0605279.

[62] Irina Shklovski, Louise Barkhuus, Nis Bornoe, and Joseph 'Jofish' Kaye. 2015. Friendship Maintenance in the Digital Age: Applying a Relational Lens to Online Social Interaction. In *Proceedings of the 18th ACM Conference on Computer Supported Cooperative Work & Social Computing (CSCW '15)*. ACM, New York, NY, USA, 1477–1487. <https://doi.org/10.1145/2675133.2675294>

[63] Hugh S. Smith and Lawrence H. Cohen. 1993. Self-Complexity and Reactions to a Relationship Breakup. *Journal of Social and Clinical Psychology* 12, 4 (Dec. 1993), 367–384. <https://doi.org/10.1521/jscp.1993.12.4.367>

[64] Stephanie Tom Tong. 2013. Facebook use during relationship termination: Uncertainty reduction and surveillance. *Cyberpsychology, Behavior, and Social Networking* 16, 11 (2013), 788–793.

[65] Jessica Vitak. 2012. The impact of context collapse and privacy on social network site disclosures. *Journal of Broadcasting & Electronic Media* 56, 4 (2012), 451–470.

- [66] Pamela Wisniewski, Heather Lipford, and David Wilson. 2012. Fighting for my space: Coping mechanisms for SNS boundary regulation. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems*. ACM, ACM, Austin, TX, 609–618.
- [67] Xuan Zhao, Victoria Schwanda Sosik, and Dan Cosley. 2012. It’s Complicated: How Romantic Partners Use Facebook. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems (CHI ’12)*. ACM, New York, NY, USA, 771–780. <https://doi.org/10.1145/2207676.2207788>