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Presenting the Self on Unstable Ground

Adaptive Folk Theorization as a Path to Algorithmic Literacy on Changing Platforms

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Abstract

Algorithmically-driven social platforms present a challenge for self-presentation and identity management by obscuring audiences behind algorithmic mechanisms. Users are increasingly aware of this and actively adapting through folk theorization, but we do not know how users are coping with the constant change endemic to these platforms. We also do not know how we can assist users in coping with this change on an ongoing, extensible basis. This dissertation presents an exploratory look at these questions via a grounded theory study of an Asynchronous Remote Community with 25 everyday users of social platforms who, by virtue of being LGBTQ+, have heightened self-presentation concerns. Results highlight the importance of the level of complexity which one is theorizing about platforms, as well as the impact of user perceptions of the platform's overall spirit on folk theorization and adaptation to change. This dissertation contributes a three-tier classification system for folk theorization, Folk Theorization Complexity Level (TCL), an updated concept of platform spirit as applied to social platforms, and a set of illustrative adaptation pathways which help us better understand differential adaptation behavior. Moreover, it argues that, in light of these findings, folk theorization is a promising path towards promoting a robust Algorithmic Literacy, with preliminary directions towards implementation.

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Dedication

To Keiko and Zoe, who guided me when I was lost.

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1 Introduction

Imagine that you are a closeted transgender woman and lesbian from a highly religious family, striking out on your own in a new city. The local queer Facebook community becomes your lifeline. It provides you with leads on housing, jobs, and, importantly, friends that validate your core identity – the first time that you've had that kind of support in your life. At the same time, while they may not be so supportive, your family is still important to you. Mediating your relationship with them via Facebook provides just the right mix of contact and distance to avoid conflict. It has to be Facebook in both cases – that's where the local queer community is, for better or worse, and teaching Grandma to use your private Discord server instead seems like an awful lot of work. This social platform, which you know from news reports to be algorithmically-driven, has two very important audiences to whom you show two very different sides of yourself – two different contexts, which you don't want collapsed. You need to figure out how to manage what parts of how you're presenting yourself are visible to which parts of the audience.

You do your due diligence. Some searching brings you to articles which tell you that content distribution on Facebook is largely based on who you engage with and what kind of content the reader usually consumes. This is information you can use in order to figure out how to effectively achieve your self-presentation goals, and now you've got your own theory of how Facebook works – your folk theory. You apply that theory religiously, making sure your queer posts have every tag and keyword needed to establish them as content Facebook would never think your grandmother was interested in, and mostly keeping your interactions with Grandma to Messenger. This works brilliantly – for a month, at which point Facebook changes

something on their backend, and your strategy no longer works. Grandma sees that picture of

you in the cute skirt, out with your girlfriend, and now you need new holiday plans.

Our hypothetical user has an unusually high level of algorithmic awareness. She also

presents herself in the heightened context of having a stigmatized identity, making these

kinds of self-presentation decisions unusually salient to her (Blackwell, Birnholtz, & Abbott,

2015; DeVito, Walker, & Birnholtz, 2018; Goffman, 1963). She was aware that the social

platform she relied on for both benefit and protection was algorithmically-driven, and that

accounting for this algorithm could be beneficial. Implicitly, she knew that to use the

platform effectively – to achieve her self-presentation goals while avoiding pitfalls ranging

from embarrassment (Litt et al., 2014) to stigmatization, harassment, and physical threats

(DeVito, Walker, et al., 2018) – she had to decide how to use the visibility and audience

management tools the platforms afforded her as part of the self-presentation process

(DeVito, Birnholtz, & Hancock, 2017; Litt et al., 2014). However, as social platforms are

often opaque and hard to understand, making audiences difficult to predict or reliably target

(Beer, 2009; DeVito, Birnholtz, et al., 2017; Gillespie, 2014), she had to rely on her *folk*

theory for guidance in this decision-making.

Humans naturally try to form causal explanations of phenomena in the world (Gelman

& Legare, 2011; Keil, 2012b), which we broadly refer to as *folk theories*. In the context of HCI,

folk theories are lay, socially-constructed conceptions of how a platform works, which the

theorizer then uses to guide their on-platform decision-making behavior (DeVito, Birnholtz,

Hancock, French, & Liu, 2018; DeVito, Gergle, & Birnholtz, 2017). However, once a folk theory

is formed and successfully deployed once, there is no guarantee it will work again. Social

platforms, and especially the criteria by which algorithmically-driven content distribution mechanisms operate, are constantly in flux (Gillespie, 2014) and provide few cues for users as to when change has occurred and what the change is. A very effective self-presentation strategy based on folk theory knowledge could suddenly be inadequate or even misleading if that folk theory knowledge is outdated and the system needs to be re-theorized. Folk theories can guide users towards effective self-presentation behavior – until they become outdated without much warning.

Despite the opaque environment and rapid, frequent change, users adapt (e.g., (DeVito, Gergle, et al., 2017; Skrubbeltrang, Grunnet, & Tarp, 2017)). For many,, this is an absolute necessity – social platforms, acting as the modern equivalent of a public square for individuals and businesses alike (Gillespie, 2018b), have become deeply integrated into their personal and professional lives (e.g. (DeVito, Walker, et al., 2018; Ellison, Steinfield, & Lampe, 2007; Klawitter & Hargittai, 2018)), even to the level of outright "delegation of human behaviour to algorithmic processes" (Willson, 2017, p. 139). It is now a crucial life skill to be able to effectively use algorithmically-driven social platforms – as Cotter puts it, to "play the visibility game" (Cotter, 2018). In order to do that, we need folk theories that guide us in a useful direction, as it is the knowledge that constitutes these theories which allows us to autonomously exercise our own judgement, as Cotter and Riesdorf write:

> *"Without knowledge of algorithmic curation, users lack crucial insight into the various factors influencing who and what reaches them in search results and social media feeds. The absence of this insight undermines an individual's ability to make rational judgments" (Cotter & Reisdorf, 2020, p. 748).*

In the context of content production and self-presentation, these "rational judgments" are about self-presentation strategy and how to use the affordances of a social platform to

achieve one's own goals. An outdated folk theory, based on outdated knowledge, would not provide an adequate basis on which to autonomously decide the best way to enable one's desired presentation. To maintain the ability to effectively pursue their own self-presentation goals, users must not only theorize about and adapt to an opaque system, but do so repeatedly under unpredictable circumstances without any guarantee of institutional guidance or assistance. Effectively, social platform users must be able to generate their own "crucial insight" on each new version of the platform. This suggests that what users need is not simply a set of static skills or guidelines, but rather the ability to critically evaluate, theorize, and dynamically adapt to whatever circumstances they encounter on the platform, which we would generally call a literacy (DiSessa, 2001; Leu, Kinzer, Coiro, & Cammack, 2004).

As of yet, we do not have a detailed understanding of the everyday process of repeated folk theorization and adaptation that casual, non-professional users employ to maintain their ability to effectively pursue their goals in the face of rapid and sometimes subtle changes to algorithmic systems. While we do have some existing knowledge of this type of adaptation, it is restricted to the context of initial adaptation among professional or power users such as social media influencers (Cotter, 2018) and digital entrepreneurs (Klawitter & Hargittai, 2018). Deeper investigation in this area in the context of everyday, non-professional users will further refine our understanding of both the personal folk theorization process and self-presentation process, making both more robust to change. This, in turn, will provide insight into how to better support users and keep them informed during transitions to new versions of social platforms in a way that continues to support the

achievement of the user's own goals. Moreover, by engaging the process of folk theorization directly in the context of adaptation, we can gain insight into how the existing process of adaptation can be leveraged to start building and encouraging a more extensible literacy in this area, including how platforms themselves can support this effort. This, in turn, could help combat an emerging gap in overall algorithmic knowledge which currently breaks down along socioeconomic lines, indicating underlying structural inequity (Cotter & Reisdorf, 2020), helping us to avoid cementing an updated, algorithmic version of the digital divide and the resulting digital inequality (DiMaggio & Hargittai, 2001).

In this dissertation we present an Asynchronous Remote Community (MacLeod et al., 2017; Maestre, Eikey, et al., 2018; Maestre, MacLeod, et al., 2018; Walker & DeVito, 2020) study of how non-expert, non-professional users notice, theorize, and adapt to change on algorithmically-driven social platforms in the context of self-presentation. We perform a constructivist grounded theory (Charmaz, 2006) analysis of seven weeks of varied elicitation prompts and follow-up interviews with a group of queer participants who have heightened, but not professional, self-presentation circumstances. We find that self-presentation-related adaptation in this context is impacted by the sophistication of the folk theorization the user is engaged in as well as the user's existing relationship to both the platform at large and the specific change in question. We contribute a new system for classifying folk theorization alongside a set of model adaptation pathways, a revised concept of technology spirit (Cheikh-Ammar, 2018; DeSanctis & Poole, 1994) for the social platform era, updates to prior folk theorization and self-presentation models which account for platform change, and a new definition of and direction for a future algorithmic literacy.

2 Background

As algorithmically-driven platforms have become more and more embedded in our lives and power structures (Beer, 2009; Gillespie, 2014, 2018a; F. Pasquale, 2015; Willson, 2017), calls for algorithmic accountability via some form of increased algorithmic knowledge have emerged (e.g. (ACM US Public Policy Council, 2017; F. A. Pasquale, 2011; Rainie & Anderson, 2017)). These are often tied to values-based concepts espoused by Friedman et al. (Friedman & Kahn, 2003), such as the ethical requirement for accountability, freedom from bias, and user autonomy. The most frequently prescribed solution to the accountability problem thus far is a focus on transparency, starting with early recommendations to require transparency of rudimentary search engine and flight selection algorithm criteria (Friedman & Nissenbaum, 1996; Introna & Nissenbaum, 2000). More recently, traditional bastions of cultural accountability such as journalism (Diakopoulos, 2015; Diakopoulos & Koliska, 2016), as well as more directly technical venues such as computer science academia and industry groups (ACM US Public Policy Council, 2017; Sandvig, Hamilton, Karahalios, & Langbort, 2014) have issued similar calls. The European Union has gone so far as to codify a public "right to explanation" when decision-making algorithms are in play, effectively a legal requirement for transparency (Goodman & Flaxman, 2016). However, transparency has its limits. Both too much and too little transparency have been shown to be problematic for users (Kizilcec, 2016), and as Ananny and Crawford (2018) have more recently pointed out (and cognitive scientists have held for years (Rozenblit & Keil, 2002)), the ability to fully examine the innards of a complex algorithmic system does not automatically impart the knowledge necessary to actually understand it, much less to act on that knowledge.

Specific calls for algorithmic accountability via an "algorithmic literacy" have emerged from the research, policy, and business communities (Rainie & Anderson, 2017) as well as in the popular press (C. N. Davidson, 2012). These calls are sensible considering what literacies have often been in our society: responses to new ideas and technologies which create new power structures and a need for average people to understand and interact with those new structures (Leu et al., 2004). For algorithms and the systems they drive, this shift in power has come from the aforementioned structural ascendency of algorithmic authority into areas such as information curation, banking, housing, and even cultural production (Beer, 2009; Napoli, 2014; Rainie & Anderson, 2017; Sandvig et al., 2014; Striphas, 2015). Considering the already-detectable gap in usable algorithmic knowledge along lines of education, age, and socioeconomic status (Cotter & Reisdorf, 2020), an increased focus on algorithmic or a related literacy is essential as a bulwark against stripping users of their autonomy along what are essentially class lines.

How to approach this algorithmic literacy is still an open question. For guidance, we can look to a precursor power shift, the proliferation of the internet itself. Once a story of digital "haves" and "have nots," internet use and skill became the focus of much research in the early 2000s (DiMaggio & Hargittai, 2001; Litt, 2013). Key researchers such as Hargittai (2002) advocated for a focus on effective and efficient individual use instead of simple access (the "second-level digital divide"), while others such as Gurstein (2003) added the goal of bridging the digital divide by empowering individuals to not just consume, but instead intelligently participate in the new medium to accomplish their own goals. Considering the threat to autonomy that algorithmically-driven platforms present (Cotter & Reisdorf, 2020),

juxtaposed against the sheer amount of embeddedness influence these systems have (Beer, 2009; Cotter & Reisdorf, 2020; DeVito, Birnholtz, et al., 2018; Gillespie, 2014, 2018a; Willson, 2017), we follow this example and explicitly take up a definition of **algorithmic literacy** based on Gurstein's definition of effective use for ICTs generally (Gurstein, 2003): *the capacity and opportunity to be aware of both the presence and impact of algorithmically-driven systems on self- or collaboratively-identified goals, and the capacity and opportunity to crystalize this understanding into a strategic use of these systems to accomplish said goals.*

Of course, there are key differences between prior literacies and emerging technological literacies which need to be taken into account; as Leu et al. point out, here there is far more of a need to focus on the context of the whole sociotechnical system, maintain a two-way relationship between literacy and technology, and approach understanding systems in a continuously critical way (Leu et al., 2004). This last point is essential, as it reflects the ever-changing nature of algorithmically-driven platforms themselves (Gillespie, 2014). Any algorithmic literacy must deal with this need to be constantly critical in the face of change. This requires us to move beyond previous treatments of algorithmic literacy and related knowledge as static (Klawitter & Hargittai, 2018), as well as skills based "checklist" approaches (e.g., (Hargittai, Gruber, Djukaric, Fuchs, & Brombach, 2020)) which, like past approaches to information literacy, focus on assessment of specific, limited skills at one point in time rather than an ongoing, extensible educational process (Webber & Johnston, 2000). It also requires us to be mindful that, as was the case with media literacy, individuals are already immersed in the environment in question (there, media; here, platforms), making algorithmic literacy an exercise in mostly formalizing and correcting knowledge found in the

world instead of purely introducing new knowledge (Kellner & Share, 2005). As luck would have it, these requirements point us to a potential lens on algorithmic literacy which accounts for all of them: folk theorization.

2.1   Folk Theories, Folk Theorization, and Self-Presentation

Folk theories are a concept with many different applications and definitions in fields like interpretivist anthropology (Gelman & Legare, 2011) and positivist developmental cognitive science (Keil, 2003, 2010, 2012a, 2012b). At their most basic, folk theories are intuitive, informal theories that reflect ideas about causal relationships (Keil, 2010). Alternately, they have also been defined as "intuitive causal explanatory theories that people construct to explain, interpret, and intervene in the world around them" (Gelman & Legare, 2011). In the specific context of algorithmically-driven social platforms, DeVito et al. define folk theories as "intuitive, informal theories that individuals develop to explain the outcomes, effects, or consequences of technological systems, which guide reactions to and behavior towards said systems" (DeVito, Gergle, et al., 2017). At their core, these theories explain how users deal with the complexity of platforms which they have no direct technical knowledge of (DeVito, Gergle, et al., 2017).

Folk theories are a natural fit for both the technological context of algorithmically-driven social platforms and the literacy-related concerns and commitments described above. Folk theories are an important part of how we naturally learn about complex domains (Keil, 2003, 2010), especially when mechanism is involved. Human beings, generally, are interested in mechanism but bad at understanding mechanism (Keil, 2012b), which results in us naturally forming folk theories of complex mechanism such as algorithmically-driven platforms. Folk

theories are also flexible enough to account for the uncertainty and instability inherent in human understandings of complex systems, in that they do not require full mechanistic detail or even dense mechanistic knowledge to be useful (Keil, 2010, 2012b), account for the fragmentary nature of non-expert understanding (Gelman & Legare, 2011; Rozenblit & Keil, 2002), and can internally contradict each other in a relatively stable fashion (DeVito, Birnholtz, et al., 2018; Eslami et al., 2015; Gelman & Legare, 2011; Keil, 2010). Essentially, folk theories let us meet the user where they are in terms of understanding and literacy, regardless of how contradictory, sparse, or fragmented these understandings may be. This, in turn, lets us account for the repair-based nature of this new potential literacy, instead of attempting to start from scratch (Kellner & Share, 2005).

Of course, meeting the user where they are is not enough for algorithmic literacy; we must also have an approach that supports users in building literacy and which can deal with the rapid change endemic in platforms. Folk theories are naturally malleable and changeable over time (DeVito, Birnholtz, et al., 2018; Rottman & Keil, 2012; Rozenblit & Keil, 2002), and may in fact improve with repeated rounds of theorization (Rottman & Keil, 2012). As we pursue an extensible literacy which supports users not in applying rote knowledge, but rather in critically evaluating systems on their own terms (Jenkins, Purushotma, Weigel, Clinton, & Robison, 2009; Leu et al., 2004; Webber & Johnston, 2000), the nature of folk theories as narratives we tell ourselves – as stories – also comes into play.

Stories are, essentially, sensemaking tools optimized for the human mind which help us relate seemingly-isolated pieces of knowledge (DiSessa, 2001; Herman, 2013). Folk narratives generally have always been a key part of how humans learn to relate effect and

intent (Ratner & Olver, 1998), and narrativization is a key part of how we learn to deal with both complex phenomena and change over time, especially in situations when our prior understanding of the world fails us (Herman, 2013). Perhaps most importantly, folk theory narrative builds on itself. Simple functional knowledge can become structural knowledge, which then becomes an ability to figure out the world and adapt on one's own (DiSessa, 2001). By starting in the user's own folk theory – their own narrative of how platforms work – we can pursue the kind of extensible understanding literacy requires, and how to build it over time (Ahl & Keil, 2016; Keil, 2012a).

In the domain of HCI, examining user folk theories has been operationalized as a diagnostic technique, used to examine the extent to which users understand certain concepts, how they deal with certain problems, and how they accomplish discrete tasks. Both Eslami et al. and Rader et al. examined user folk theories of how content is delivered to them via algorithmically-driven social platform feeds, diagnosing an overall low level of algorithmic awareness in 2015-2016. Both research teams found distinct folk theories held by groups of users with associated consequences for platform use and design (Eslami et al., 2016; Eslami et al., 2015; Rader & Gray, 2015). Bernstein et al. undertook more focused study in the same context to diagnose the extent to which and reasons why Facebook users misestimate their invisible audiences on the platform (Bernstein, Bakshy, Burke, & Karrer, 2013). DeVito et al. also examined folk theories of curation by platforms, but in the specific context of a large-scale negative reaction to platform change to diagnose the nature and causes of the backlash (DeVito, Gergle, et al., 2017). French and Hancock, by contrast, focused less on mechanism and more on affect in their study of metaphorical folk theories of the

influence of social platforms on content posting (French & Hancock, 2017). The approach has also been applied outside the domain of social platforms, e.g. Rader and Slaker's work on folk theories of wearable and smartphone-based sensors in a privacy context (Rader & Slaker, 2017). Regardless of their domain, these studies generally report out on specific, usually mechanistically-focused folk theories of specific technologies at one point in time – excellent for diagnosing problems in design, but of limited utility when attempting to move towards a sustainable, extensible literacy.

A second group of studies, of which there are few, focus not on folk theories themselves, but the process of how users form these folk theories. For example, DeVito et al. examined how folk theories are formed in the context of self-presentation as instantiated through posting behavior, identifying not only how users form theories in this context, but how this process is embedded within and impacts the key social process of self-presentation (DeVito, Birnholtz, et al., 2018). It is this second type of folk theories approach – a *folk theorization* approach – which we take in this project.

2.1.1   Folk Theories and Self-Presentation

Self-presentation (and its more generalized form, impression management) is the process by which we attempt to control how others view us (Goffman, 1959; Leary & Kowalski, 1990; Spencer-Oatey, 2007). It is a constant, universal process which humans are either engaged in or monitoring for opportunities to engage in at all times (though it may not be salient at all times) (Leary & Kowalski, 1990), and it constantly plays out via algorithmically-driven social platforms (DeVito, Birnholtz, et al., 2017; Litt et al., 2014). Due to its ubiquity, the fact that it is highly impacted by algorithmic mechanisms (DeVito,

Birnholtz, et al., 2017), and the existence of a static version of its relevant folk theorization (DeVito, Birnholtz, et al., 2018) process, it is an ideal process on which to focus our attention in order to examine adaptation to platform change.

The crucial core mechanism in this process, according to Goffman's dramaturgical model of self-presentation, is a two-way interplay between the self and one's audience which guides the entire process, letting the self in question know what is and is not appropriate for this particular audience (Goffman, 1959). Social platforms, however, directly threaten this interplay, as the algorithmic mechanisms which control content distribution obscure one's audience, leaving few cues with which to imagine one's audience, and little information on which to base self-presentation decisions (DeVito, Birnholtz, et al., 2017). For those that are in some way aware that there is an algorithmic mechanism at play, this gap in the self-presentation process is bridged by a folk theory of how the mechanism in question distributes content, which then informs self-presentation behavior by allowing users to account for the mechanism itself during decision-making (DeVito, Birnholtz, et al., 2018).
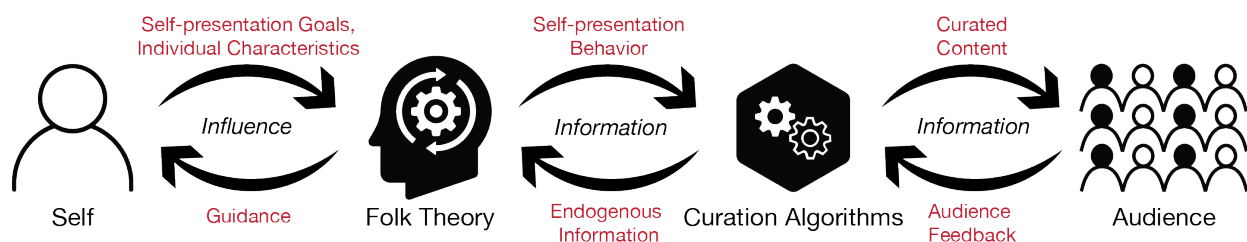
Figure 1: Cross-section of the self-presentation process showing the impact of folk theorization from (DeVito, Birnholtz, et al., 2018).

DeVito et al. mapped out the folk theorization process in this context, finding a theorization process which includes foraging for both endogenous (based on the platform itself, e.g. experimenting with the system) and exogenous (originating from outside the

platform, e.g. from the news) information, and an active sensemaking component, resulting in a folk theory which guides behavior but is malleable enough to be changed (DeVito, Birnholtz, et al., 2018). It is this process, which was captured as a static snapshot that this study attempts to put into motion in order to better understand user adaptation.
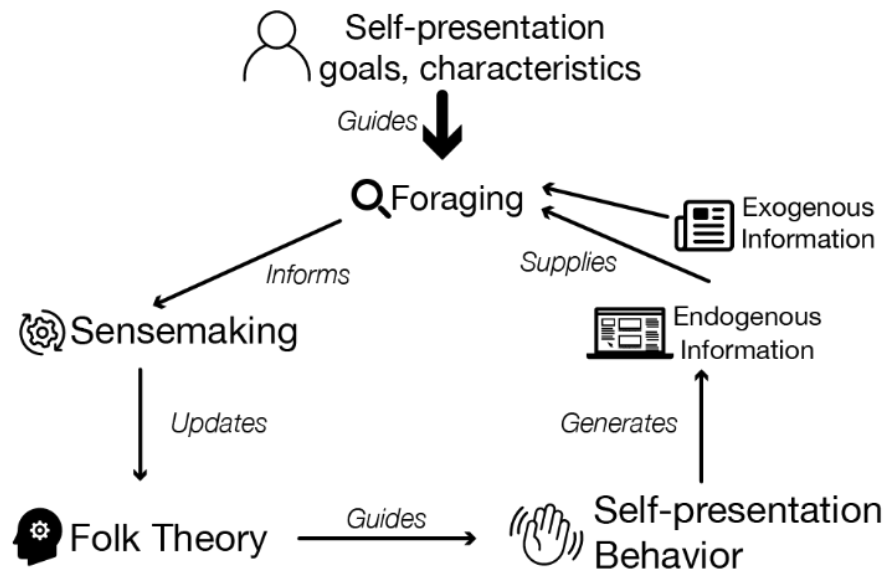
Figure 2: Initial folk theory formation process in the context of self-presentation from (DeVito, Birnholtz, et al., 2018).

However, this process is not activated unless there is at least some level of algorithmic awareness present, and accounts of algorithmic awareness in the literature vary. Eslami et al. and Rader et al. posit that algorithmic awareness in the context of social platforms is quite low (Eslami et al., 2015; Rader, Cotter, & Cho, 2018; Rader & Gray, 2015), while DeVito et al. advanced the idea that we do not adequately examine low-level (or "abstract") understandings of algorithms, and therefore underestimate awareness (DeVito, Gergle, et al., 2017). As such, we must first ask:

RQ1: To what extent are users aware of and theorizing about algorithmically-driven social platforms?

2.2   Noticing Change

To study perceptions of change, we must first define what change, in this situation, means. When dealing with algorithms within computer science, we might imagine change as literal mechanism change, such as the steps in a procedure for sorting a list are rearranged or otherwise modified, resulting in a different output than the original arrangement would have produced. This is also the type of change that earlier accounts of the problems related to the opacity of platforms largely focused on: changes to the ways crucial algorithmic decision making systems work that are largely opaque to the user and potentially have downstream social or societal consequences (e.g., (Gillespie, 2014; F. Pasquale, 2015)). However, in this case, there is evidence that suggests mechanism change is not the sole, or even the most relevant, concern in terms of the average user's perceptions of a platform. Instead, two major factors require us to adopt a more holistic view of change: the sheer complexity and lack of transparency of algorithmically-driven systems, and the newfound prominence of algorithmically-driven systems in the news media and popular culture.

The first major factor is related to a core truth about algorithmically-driven systems: they are quite complex and are almost never transparent down to the mechanism level. This is because the algorithms themselves are often trade secrets and direct knowledge of them could encourage gaming of the system (Gillespie, 2014; F. Pasquale, 2015). As mentioned earlier, transparency does not necessarily solve complexity of these systems. Even if a system were entirely transparent, it is unlikely that this would mean all types of change

(down to the mechanism level) would be immediately noticed by all users. Consider the phenomena of "change blindness" in which individuals fail to notice what one might reasonably consider noticeable or even obvious changes to the situation in front of them – a concept that the field of cognitive science has applied to both in-person and interface-based situations (Gelderblom & Menge, 2018; Simons & Levin, 1998; Simons & Rensink, 2005).

Several key criteria contribute to change blindness which make it specifically difficult to pick out changes in an intricate algorithmically-driven system, including unexpectedness of change, lack of system explainability, the small magnitude of many changes, and the lack of a direct connection to user functionality in some cases (Simons & Levin, 1998). Unexpectedness is the most dynamic of the criteria, for reasons we will detail in the next section; briefly, we are currently unsure of the overall amount of change users regularly expect. Lack of system explainability is a known problem with algorithmically-driven systems (Rader et al., 2018), which makes it difficult to verbalize the changes that one might notice to a system, a process which appears to help users solidify their understanding of (and reactions to) perceived change (Simons & Levin, 1998).

Perhaps more important, though, are the last two criteria, magnitude and relationship to the user's own experience. Here, we see the practical difficulty with defining and identifying change within the algorithmic domain: changes are often small, quite subtle, and sometimes purposefully obfuscated, and not all changes have a direct connection to the user's own experience. Consider the scenario where Facebook tweaks their ad serving algorithms to insert each ad into the News Feed after three posts instead of four, and who may notice. It's possible no one would even notice, as this is a very small change. In this case,

the magnitude may not be great enough to "count" as a change in the mind of the average user. The magnitude may be great enough, however, for a social media manager charged with managing a corporate page to notice, as how understanding promoted posts work and are placed is part of the bread and butter of this person's job – small magnitude, but high personal salience to that particular user's needs and job goals, and therefore a noticeable change. In turn, the communications director of said corporation would likely not see this as a change – to them, the ad placement process is roughly "tell the social media manager to place some ads," abstracting out the algorithmic component entirely.

Considering the great variation in both magnitude and relevance to changes on algorithmically-driven social platforms, which can range from major interface overhauls to invisibly changing one line of code in the Feed algorithm, it is essential that we consider change in light of not just the overall magnitude of this change, but the magnitude as shaped by the direct relevance of the change to the needs and goals of the individual user. Specifically, here, we are concerned with the user's self-presentation goals, as self-presentation is a distinctly goal-based endeavor which provides exactly the kind of task-related valence and immediate need that can prompt a person to notice a change (Arkin, 1981; Simons & Levin, 1998).

The second major factor motivating a holistic definition of change is the heightened attention that algorithmically-driven platforms have recently been given in the news media and popular culture. Though they may lack details, recent work indicates that people are more aware of algorithms and the broad strokes of what they do than in the past and, despite the lack of mechanistic knowledge that academic studies have identified, have plenty of

opinions about algorithmically-driven systems and the companies that control them (Smith, 2018). This is true to the extent that even Alphabet, the parent company of Google, has issued guidance to investors naming negative perceptions of algorithmically-driven systems as one of their largest outstanding business risks (Alphabet_Inc., 2019). This focus on not just mechanism but ownership is also borne out in past work on algorithmic awareness.

High-profile incidents of algorithmic change demonstrate a regular pattern of users conflating actual mechanistic change to the platform with change based in platform policy and with the actions of the platform as a whole (DeVito, Gergle, et al., 2017; Skrubbeltrang et al., 2017). In the specific case of #RIPTwitter, this went as far as equating changes to the way the platform displayed tweets to direct actions by the company's CEO, Jack Dorsey, and an accompanying vitriol rife with speculation that the change to the platform was really a power/money grab. This pattern suggests that there is not much space in the user's mind between the algorithmic mechanisms that actually operate the platform, the policies that determine how people are allowed to use the platform, and the actions, opinions, and priorities of the platform's owner. In other words, for the average user, there is no News Feed algorithm, Facebook the platform, and Facebook Inc., the company – there is just Facebook, the major presence in their day to day life. This is further supported by the cognitive science literature, which suggests that in cases of folk theory reasoning (or any speculative lay reasoning more generally), individuals have the ability to draw conclusions and notice patterns about systems in the absence of mechanistic detail, relying instead on relevant cues from the larger environment and loose assessments of causality based on the density of these cues and their associated sense of what entities (here, the platform) have

the power to cause effects (Keil, 2012b). In the process of noticing and cataloguing these cues and power relationships, users necessarily conflate platform, ownership, and mechanism.

In light of these issues, the heart of understanding user adaptation is focusing on perception – users adapt using the knowledge and perceptions they have. As such, drawing on recent work which suggests centering not just the user but their positionality and relational orientation when trying to understand user perceptions (Baumer & Brubaker, 2017), as well as the increased and largely unavoidable presence of platforms in everyday news reports, we will not attempt to disentangle perceptions of change by source.

Here we will define "**change**" specifically from the vantage point of the user's perception, within the domain of self-presentation: *any perceived difference relating to a social platform which the user believes may impact their use of or decision making around achieving their self-presentation goals via said social platform*. Importantly, we do not assert a difference between perceived changes that reflect real-world change and perceived changes that have no basis in real-world change, as users have no access to a changelog, only their perceptions, making "truth" irrelevant to the sensemaking and folk theory formation process. Again, as we have seen in past studies, the truth of what is happening has minimal relevance to the user; they form folk theories, adapt, and even start protests with the knowledge they perceive (DeVito, Birnholtz, et al., 2018; DeVito, Gergle, et al., 2017). As such, while we will sometimes analyze sources of folk theory knowledge individually, we will overall consider the user's understanding of how a platform operates and has changed holistically. Similarly, in assessing the effectiveness/utility of a change-related folk theory or adaptation, we will do so in terms of how well the folk theory or adaptation helps the user effectively use the

technology in question achieve their individual self-presentation goals, following the precedent set by modern definitions of general internet literacy (Gurstein, 2003; Hargittai, 2002).

It is also important at this point to define how we will bound what counts as a change in one's folk theory of a system. Prior work has shown that folk theories are quite malleable, and especially so when they rely on a broad basis of data outside just the user's on-platform experience (DeVito, Birnholtz, et al., 2018), e.g., the conflated conditions we have described above. This is further contextualized by cognitive science findings that suggest that, at least in some users, stimulus that pushes on current folk theories (e.g., an expectation violation) can cause the re-evaluation of one's theory (Mills & Keil, 2004). As such, we can reasonably expect that, when users notice a change as described above, there is a good possibility that the user's folk theory will change in turn. However, the nature of this change can be quite subtle, as users folk theorize at levels ranging from simple relevancy to entities (e.g., X factor relates to a system somehow) to full mechanistic understanding (e.g., X input factor directly causes Y output from the algorithm) (Keil, 2012b). Considering our prior commitment to center the user's own perceptions and understandings, here we will define an **"update" of one's folk theory** as *any adjustment to a user's folk theory which reflects a change in belief around what an algorithmically-driven system does or how it does it*. Again, the technical reality of the system is largely irrelevant here; it is the user's internal sense of causal or semi-causal linkages that we are interested in assessing for change.

Ultimately, to adapt to change, one must first notice change, and understand that it is, in fact, a change. This crucial "noticing" step is the start of all sensemaking processes (Weick,

Sutcliffe, & Obstfeld, 2005), including the already-established formation process for self-presentation-related folk theories of algorithmic systems (DeVito, Birnholtz, et al., 2018). As such, with change now defined, we ask:

RQ2: How and to what extent do users notice change on algorithmically-driven social platforms?

2.3 Deciding To Act (or Not)

In most technology-related sensemaking processes, once change is noticed, users begin adapting by trying to apply their previous theory (here, a folk theory) of how a process or piece of technology works, "bracketing" (or bounding) what has actually changed (e.g., what seems to not work anymore about the present theory), applying previous knowledge to see if this change fits into a category of similar changes which would have similar solutions (labeling), and eventually creating a believable story about the change that can guide the subsequent reaction to the change (Weick et al., 2005). However, this process is not guaranteed – not all users adapt in the face of change, or even continue using a technology. Though, as noted, done in a different context than the present study, the management information technology literature suggests that acceptance of change and continuance of use are conditioned on factors such as how much users believe can be gained from use/adaptation, perceived ease of use, and as socially-shared interpretations of the technology/change, and how the technology relates to the user's own ideology (Barrett, Heracleous, & Walsham, 2013; Orlikowski & Gash, 1994; Venkatesh, Morris, Davis, & Davis, 2003). Clearly, there are factors outside the literal content of the change which we must account for.

One instructive model we will use as a sensitizing concept in interpreting our results is Adaptive Structuration Theory (AST). Developed in the 1990s as a way to approach investigating the social and behavioral effects of technology in workplace settings (DeSanctis & Poole, 1994), it has subsequently been updated to deepen the theory's focus on relational understandings of technology capabilities (Markus & Silver, 2008), and to account for the wave of ubiquitous, always-on, individualized technologies (e.g., smart phones) that has subsequently redefined what technologies most of us use on a daily basis (Schmitz, Teng, & Webb, 2016). The core of the theory is that existing structural features provide a bounding framework for how individuals will respond to changes in technology (DeSanctis & Poole, 1994). Here, "structural features" refers to the inputs to this process that can be said to exist "in the world" at the start of the sensemaking loop. This includes features such as technical structures (e.g. affordances) (DeSanctis & Poole, 1994), individual psychological characteristics (e.g., personality factors), and prior knowledge (here, the encapsulated as user's existing folk theory) (Schmitz et al., 2016), as well as the nature of the task a user is trying to perform (DeSanctis & Poole, 1994) and the platform's spirit (Markus & Silver, 2008).

Importantly, the last two items on that list require some reconsideration for our case, as both "spirit" (a highly disputed concept) and "task" may take on different meaning in a social platform content. These theories and their concepts were developed largely for business contexts with top-down authority structures, clearly-staged change processes, and a financial incentive for use which does not mirror the highly personal, highly social, extremely

distributed context of social platforms (Daft & Lengel, 1986; DeSanctis & Poole, 1994; DeVito, Gergle, et al., 2017; Keil, 2003; Orlikowski & Hofman, 1997).

2.3.1 Rehabilitating Spirit for a Social Platform Context

According to Orlikowski and Gash, our perception and, in turn, our use of a technology is shaped by differing views on the "nature and functionality" of said technology (Orlikowski & Gash, 1994). In practical terms, "nature" has largely been operationalized as "spirit," while the perception side functionality is usually operationalized as "task-technology fit." However, in accounting for these factors in the highly personal social platform context, it is important to reexamine and potentially update these organizationally derived concepts.

Thus far, the story of spirit has been one of increasing co-construction with users as well as increasing conflation, as the concept has become more and more user-centric. In originally defining the spirit of a technology, DeSanctis and Poole chose to focus on the normative frame around the technology, essentially the official line as to how it is supposed to be interpreted, as based in the official training, help, and related materials from the creator (e.g., a software vendor) as well as what is communicated through the design choices on the platform (DeSanctis & Poole, 1994). Markus and Silver evolved this conception, pegging it as a "property of the technology as it is presented to users" and refocusing on what the technology itself suggests when read as a text by users (Markus & Silver, 2008). Later, Schmitz et al. recognized that, in the context of technology which is treated like a social actor, spirit is more fully co-constructed with user, defining it as "a user's understanding of that technology's capabilities and affordances" (Schmitz et al., 2016). Subsequently, Cheikh-Ammar further updated the concept to recognize that spirit is not only co-constructed but

part of a sensemaking process where users evaluate a platform's spirit based on its values and actions in practice, making spirit a relational concept which evolves over time (Cheikh-Ammar, 2018). This includes and largely starts with designer intent, but quickly becomes user-defined once a technology is deployed.

By contrast, task-technology fit – essentially the relationship between what users need to do with a system and what they perceive it as capable of doing – is a stable concept and has long been recognized as an important factor in technology adoption, adaptation, and continuance, whether standing on its own as a determining factor (DeSanctis & Poole, 1994; Larsen, Sørebø, & Sørebø, 2009; Schmitz et al., 2016) or as embedded in a larger concept such as user satisfaction (Bhattacherjee, 2001). In AST, much of the adaptation behavior observed is explicitly about either reshaping one's tasks to fit the technology, or manipulating the technology to enable one's task (DeSanctis & Poole, 1994). This carries over into an algorithmic context, as, recent work on perceptions of algorithmic decisions make it clear that fitness to task is a key factor in how we decide to trust or not trust algorithmic decisions more generally (M. K. Lee, 2018).

While these concepts are generally thought of as separate in an organizational context, it is possible that this is a product of the context itself. As Lapointe and Rivard note, decisions around whether to adapt to or resist implementation of technology are often based on the user's assessment of the match between what's new and the technology's place in the current organizational or personal setting (Lapointe & Rivard, 2005). In an organizational context, tasks are business-related and have limited personal valence; by and large, failing to complete a spreadsheet for one's employer does not represent a direct threat to one's

identity and personal concerns. However, in a personal context, this may not hold, as tasks can be quite personal, e.g. maintaining lines of communication with distant relatives. We see some hints of this in past folk theories work, specifically DeVito et al.'s work on #RIPTwitter, where violations of user use cases were not just tied to an intent to stop using the system, but became intensely personal, to the extent that users felt angry and directly betrayed by the Twittter, and CEO Jack Dorsey personally (DeVito, Gergle, et al., 2017). Users frequently "articulated an already-formed expectation of how Twitter 'should' perform relative to their use case," essentially an "ad-hoc assessment of task/technology fit" which was tied directly into a sense of what a platform is for and what it had promised (DeVito, Gergle, et al., 2017, p. 3168). In other words, users saw disruptions to task-technology fit for personal tasks as an explicit violation of what we might fairly call the spirit of a platform.

Considering this preliminary evidence, as juxtaposed against our earlier commitment center this study around user perceptions, we adopt an updated concept to account for these factors, based off of Cheikh-Ammar's work (Cheikh-Ammar, 2018). We define **platform spirit** as *the user's perception of what a platform is and what it is for, as determined by the user's understanding of the platform's stated mission, its values and actions in practice over time, and the functionality which it allows as juxtaposed with the user's understanding of the platform's purpose.* This definition, while broad, will allow us to account for earlier theory while acknowledging the kind of user-side conflation observed in situations like #RIPTwitter during analysis.

With spirit updated for a platform context, we can return it to the list of structural features which impact adaptation and ask:

RQ3: How do users decide if and to what extent they will attempt to respond to change on algorithmically-driven social platforms?

2.4 Adaptation & Resistance

Finally, once the decision to adapt has been made, action must actually be taken. In the folk theorization process established for self-presentation, this would potentially include more information foraging and sensemaking to refine one's folk theory in order decide on how to update one's actual behavioral tactics, and then a deployment of these tactics as updated self-presentation behaviors (DeVito, Birnholtz, et al., 2018). As such, we must account for both what actions are taken as well as how one comes to a decision on what actions to take.

Individual social and exploratory processes largely drive adaptation to technology in an organizational context (Beaudry & Pinsonneault, 2005; DeSanctis & Poole, 1994; Schmitz et al., 2016), and we have reason to believe this will be true in a personal social platform context as well. Consider prior work in a non-organizational, social platform-based, but still professional context. Instagram influencers have been shown to work collectively to identify and adjust for upcoming changes to the Instagram feed algorithm (Cotter, 2018), while Airbnb hosts engage in strategies around updating the language and posting recency of their listings in an attempt to game the platform's search results based on forums and platform documentation (Jhaver, Karpfen, & Antin, 2018), and Etsy store owners engage in a similar, but socially-mediated, process to keep their products showing up high in their platform's searches (Klawitter & Hargittai, 2018). Considering this heightened parallel, and the foraging of both socially-sourced exogenous information and platform exploration-derived

endogenous information in our existing model of folk theorization around self-presentation (DeVito, Birnholtz, et al., 2018), we can expect some kind of information-gathering process to proceed behavior change.

In terms of final behavioral outcomes, our existing model simply suggests that updated self-presentation behavior flows from an updated folk theory (DeVito, Birnholtz, et al., 2018); the nature of the update to the behavior is not specified. As we are now working in the context of change, instead of initial theory formation, it is now necessary to expand our understanding in order to analyze behavioral impacts of platform change. In an organizational context, users adapt to systems by adjusting how they perform a task to fit the new technical reality, or by finding ways to use technology in new, often unintended ways to support the tasks as already performed (DeSanctis & Poole, 1994; Schmitz et al., 2016). In turn, these adaptations can be faithful to the technology (based in the way the platform was designed to be used) or unfaithful (outside of the way the platform was designed to be used) (DeSanctis & Poole, 1994). The work on influencers and professionals noted above largely concerns faithful adaptations (Cotter, 2018; Jhaver et al., 2018; Klawitter & Hargittai, 2018), but we do not yet have a clear picture of how the nature of these adaptations in a personal, everyday use context. As such, we ask:

RQ4: How do users adapt to platform change on algorithmically-driven social platforms?

3 Methods

One of the primary challenges in this study was elicitation of what may be subtle concepts from the participants, especially considering the complex, multi-sourced nature of the folk theorization process (DeVito, Birnholtz, et al., 2018) and the subtle, sometimes almost invisible nature of change on algorithmically-driven social platforms (F. Pasquale, 2015). Additionally, as noted above, we are committed to working at the level of user perception. These factors motivated us to adopt constructivist grounded theory (Charmaz, 2006) as our overall approach, allowing the inductive generation of knowledge based directly on a variety of participant experiences and perceptions. In turn, as constructivist grounded theory encourages the use of innovative, creative methods which are responsive to theoretical developments in the field (Charmaz, 2006), we adopted Asynchronous Remote Communities as our framework method.

Asynchronous Remote Communities (ARC) are an online, distributed framework for research which uses a secret social media group to deploy weekly prompts that engage participants on our key questions using multiple elicitation modalities (MacLeod et al., 2017; Maestre, MacLeod, et al., 2018; Prabhakar et al., 2017). In our case, the multiple elicitation modalities help provide the depth of data needed to draw conclusions on such a subtle topic of inquiry. ARC was initially developed and deployed in the context of health informatics research with populations where face-to-face methods were either dangerous or too high of a barrier to participation (e.g., people with stigmatized diseases, new mothers) (MacLeod et al., 2017; Maestre, MacLeod, et al., 2018; Prabhakar et al., 2017). Subsequently, ARC was further developed and modified for use in social computing research in situations where

sustained, varied access to a sample in the manner of a field site is required, but no actual field site exists, or physical sites do not allow adequate sampling, e.g., studying a phenomenon in a broadly distributed, internally-diverse marginalized community (Walker & DeVito, 2020). Moreover, this version of ARC was specifically developed to be compatible with a larger constructivist grounded theory approach. As such, it is this Walker-DeVito variant of ARC that we use as a guide for this study.

We ultimately employed a Facebook-based ARC with 25 participants, eliciting information on user folk theorization, self-presentation behavior, and adaptation to change over seven weeks of prompts and a closing one-on-one interview. Procedures were approved by our Institutional Review Board.

3.1   Participants

As noted above, a major challenge in conducting this research is the elicitation of subtle, sometimes latent knowledge. While issues around algorithmically-driven systems are essentially universal due to their widespread nature (Rainie & Anderson, 2017), there is good reason to focus this study on a group with heightened self-presentation concerns. Philosophically, this approach flows from feminist standpoint theory, which holds that approaching social problems by first studying marginalized groups or groups with heightened concerns allows us to identify not only the issues identifiable or visible by the dominant group, but rather those issues plus the issues identifiable only by those the structures around the problem are not designed to serve (Bardzell & Bardzell, 2011; Harding, 2004). In other words, members of marginalized communities have the positionality to notice and highlight issues around structures (here, the algorithmically-

driven social platforms) that mainstream users might miss, allowing us to examine both mainstream issues and potentially highly-problematic outlier experiences as well. This is not to say the issues do not exist for everyone; rather, they are often only easily visible to those that may be structurally disadvantaged. Our current knowledge of how folk theory formation and self-presentation interlock suggests this is the case for self-presentation on social platforms.

As noted above, detailed awareness of these systems is still low (Eslami et al., 2015). However, this is not to say that users in general are completely disconnected from, unaware of, or affected by these systems – even among those that have what we may not call active knowledge, we see an awareness of algorithms as an important causal force (DeVito, Gergle, et al., 2017). It may, however, mean that certain groups are more likely to have these algorithmically-related issues on their minds, and therefore we may find it easier to elicit necessary details from these groups, which we can then use to guide more general inquiries in future work on broader populations. This is backed up by what we know about the process of identifying algorithmically-driven systems as sources of blame for incidents of failed self-presentation as well, as it relies heavily on expectation violation (French, Hancock, Liu, DeVito, & Birnholtz, 2018); it is not unreasonable to assume that those with heightened self-presentation concerns, then, have more detailed expectations and more chance to see them violated. These "heightened cases" of self-presentation have already proved useful in the prior work noted above, e.g. work on Instagram influencers (Cotter, 2018), Etsy shop owners (Klawitter & Hargittai, 2018), and Airbnb hosts (Jhaver et al., 2018). In all of these cases, the fact that self-presentation/impression management in an algorithmic medium was crucial

to the livelihoods of the participants created the opportunity to survey people who had good reason to think about algorithmically-driven visibility systems far more than the average user. While these studies were not directly intended to study change or folk theorization, they provided insights that have been useful thus far.

As the heightened case of influencers/business owners has been indirectly covered by prior studies, and we are primarily interested here in the adaptation process of personal, not business, users, we turn instead to the queer community. Self-presentation is particularly salient to queer people due to social stigma. For queer individuals, a lack of deliberate self-presentation decision making can be actively harmful, with consequences ranging from basic exclusion and ostracization to physical harm, especially regarding disclosure of a stigmatized identity (DeVito, Walker, et al., 2018; Goffman, 1963). As all members of the queer community, not only influencers and professionals, share this concern, they represent an ideal context of study. This fit is only bolstered by the facts that the author is a member-researcher, and the version of ARC we are employing was developed in the specific context of the queer community (Walker & DeVito, 2020).

3.1.1 Recruitment

As the "site" of research here is the queer community, recruitment was focused on constructing a sample which was broad enough to produce transferrable results (Guba & Lincoln, 1982) while also accounting for the internal diversity of the population under study. We used Facebook ads targeted at people 18+ living in the United States who have demonstrated interest in LGBT history, LGBT culture, LGBT community, or LGBT social

movements as a primary recruitment tool, supplemented by distribution of recruiting materials through the personal networks of the research team.

In order to ensure we represented the diversity of the queer community itself, we asked those that responded to our advertisements to self-identify on several dimensions known to be relevant to the diversity queer experiences, especially in an online context. This included age (Daley et al., 2017), race (Bowleg, 2013), gender identity (Farmer & Byrd, 2015; Scheuerman, Branham, & Hamidi, 2018), sexual orientation (Walker & DeVito, 2020; Weiss, 2011), and whether a person grew up in and currently lives in an urban, rural, or suburban area (Gray, 2009; Hardy & Lindtner, 2017). Additionally, we asked if the person had ever been, or aspired to be, a social media professional or influencer. From an initial pool of over 150 respondents, we first excluded past and future influencers/professionals, and then used Trost's nonrepresentative stratified sampling technique (Trost, 1986) to select a group of 41 people to invite which adequately accounted for the factors noted above. Of that group, 35 people consented to participate in the study, and 30 at least completed the opening exercise. Ultimately, 25 people completed the study, a drop-off pattern comparable to past ARCs (MacLeod et al., 2017; Maestre, Eikey, et al., 2018; Maestre, MacLeod, et al., 2018; Walker & DeVito, 2020).

3.1.2   Demographics

While we have collected demographic data from each participant, we do not include it individually in a participant table, as these characteristics are personally identifying and not the object of study. Instead, we report them here in aggregate.

Participants ranged from 19 to 48 years old (M=27, SD=7). In terms of gender, our sample was 36% female, 36% nonbinary, and 28% male. In terms of sex, our sample was 52% cisgender and 48% transgender. In terms of sexual orientation, the sample was 36% gay/lesbian, 24% bisexual, 12% pansexual, 8% asexual, with the remaining 20% being otherwise queer. Racially, the sample was 44% White, 20% mixed race, 16% Black, 12% Latinx, and 4% each Native and Asian. 52% of the participants grew up in a rural area; 32% of participants live in one now.

3.2   Procedure

Under normal circumstances, ARCs take place in a secret (non-searchable and private) Facebook group, where participants answer varied weekly prompts directly in the group and engage each other's answers to co-construct knowledge, often building beneficial community in the process (MacLeod et al., 2017; Maestre, Eikey, et al., 2018; Maestre, MacLeod, et al., 2018; Prabhakar et al., 2017; Walker & DeVito, 2020). However, due to concern over participant privacy and how social platforms handle user data, our IRB required us to modify the format into what we refer to as a **Protected ARC**, which better secures user data while attempting to maintain ARC's community-based benefits.

3.2.1   ARC Structure and Challenges

Similar to past ARC studies (MacLeod et al., 2017; Maestre, Eikey, et al., 2018; Maestre, MacLeod, et al., 2018; Walker & DeVito, 2020), our Protected ARC was based in a secret Facebook group, with actual data collection via secure Qualtrics forms linked from the group. We chose Facebook as a platform as opposed to other alternatives due to the fact that it

remains the most used social platform with a private group functionality overall, and also has the broadest demographic reach, lacking any major userbase gaps around important factors such as gender and race (Perrin & Anderson, 2019). The Facebook group served as an administrative and community space, serving to keep the project's data collection visible to users to prevent drop-off, while also maintaining the direct beneficence of providing a community space for marginalized people, a key benefit of past ARCs (Maestre, MacLeod, et al., 2018). To support both these uses of the Facebook group, study staff started and participated in 1-2 community activity threads weekly, separate from the ARC activities. Though we agree with our IRB that Facebook also poses problems regarding the collection of personally-identifiable information, by moving the collection of all sensitive data off the platform, we avoid prompting the generation of any sensitive data Facebook would have access to. The community activities and basic organizing that remain on the platform pose no more risk than regular platform use; as all participants already had a Facebook account, this is not additional risk imposed by the study design.

The Protected ARC modifications do better protect user data, and our experience with this study suggests that the use of discrete, secure submission forms combined with intentional community-building activities results in participants not only meeting but exceeding participation rates from prior ARC studies. However, we do largely lose the community co-construction of knowledge from prior ARC work in this tradeoff. While this tradeoff is appropriate for this study, as our core aim here was to study an individual process of adaptation, any future ARC using the Protected modifications should carefully weigh the

impacts of a lack of co-constructed meaning (e.g., in a queer community setting such as (Walker & DeVito, 2020)).

3.2.2   Participant Experience

After initial recruitment per section 3.1.1, which took place via email, participants were emailed a consent form and given the opportunity to ask questions, after which they emailed back a specific consent phrase from the form to indicate their consent to participate. Those that completed the consent procedure and agreed to follow a basic code of conduct were sent an invitation to the secret Facebook group.

Each week for seven weeks, participants saw multiple posts from the study staff. On Mondays, the author posted the week's activity and a link to the appropriate Qualtrics form, and answered any related administrative/clarifying questions in the post's attached comment thread. On Fridays, one or both of the project assistants posted, participated in, and moderated a light community-building discussion, ranging from meme sharing to discussion of relevant cultural products. Additionally, on some Wednesdays, a member of the study staff posted "reflection post" communicating non-biasing information about the study which the participants had expressed interest in (e.g., demographic summaries, process vlogs).

Participants were only required to respond to the weekly activity prompt, not the social posts. The weekly prompt linked to a new activity, each designed to take a different approach to addressing one or more of our research questions. Activities ranged from journal writing and short-answer scenarios to visual elicitation and scavenger hunts; for a summary of activities and the motivations behind deploying each activity, see Table 1. For full versions

of our community (Facebook) and individual (Qualtrics) prompts for each activity, see Appendix A.

As participants submitted their weekly materials on the Qualtrics forms, the author and a project assistant read the answers and generated follow-up questions, which were sent via either email or private Facebook messages, depending on participant preference.

After seven weeks of prompts, participants were scheduled for individual follow-up interviews with the author. As we will discuss further shortly, these interviews were effectively a final, summative act of theoretical sampling in the grounded theory tradition (Charmaz, 2006), acting as an opportunity for broad follow-up on both individual responses and emerging themes. Interviews were text-based and took place on Facebook Messenger, and ranged from 57 minutes to 1 hour and 38 minutes (M=74 minutes, SD=10 minutes). All participants sat for an interview.

Activity	Rationale	%
Baseline Self-Presentation Profile: Tell us about your posting to social media – what you post about, why you post it, how you post it, and how you've done this over time. Accompanied by survey items on platforms used and scales.	Establish each participant's individual profile regarding the context in which they are theorizing, self-presentation, per (DeVito, Birnholtz, et al., 2018) in order to capture self-presentation style (Arkin, 1981), breadth of one's social media ecosystem (DeVito, Walker, et al., 2018), usage (DeVito, Birnholtz, et al., 2017), and queer self-presentation-relevant psychometric properties (platform centrality, outness (J. Mohr & Fassinger, 2000), queer identity-related experience (J. J. Mohr & Kendra, 2011), self-monitoring ability (Lennox & Wolfe, 1984), web skills (Hargittai & Hsieh, 2012)).	100
Lightning Round: Answer three prompts around attitudes and history with platforms, based on common social media activity formats. *Would you rather:* multiple choice re: posting risk. *What's*	Continue building knowledge of individual self-presentation decision making while also investigating attitudes towards platforms, crucial per (DeSanctis & Poole, 1994; Orlikowski	100

most important: prioritizing platform characteristics. *Tag your platforms:* make a tag meme in a classic format to assign personas to different platforms you use.	& Gash, 1994). Tag meme inspired by past work on folk theories as metaphor (French & Hancock, 2017) and algorithmic personas (Wu, Pedersen, & Salehi, 2019).	
Visual Elicitation: Make an image that represents how you think the platform you post to the most gets your posts from you to the people that see them.	Elicit partially-latent folk theory information, especially around structure, to access theorization process from (DeVito, Birnholtz, et al., 2018). Visual technique allows flexibility so as not to bias responses (J. C. Johnson & Weller, 2002), is proven in the ARC format (Walker & DeVito, 2020), and allows spatial benefits of card sorting (DeVito, Birnholtz, et al., 2018) without limiting participants to existing study team understanding.	100
Scenarios: Tell us how you would react to three content posting scenarios: hearing rumors that how content distribution works is changing, noticing something about the posting interface is different, and a posting-related expectation violation incident. Accompanied by need for cognition scale (Cacioppo & Petty, 1982).	Elicit change reactions, information gathering, and self-presentation behavior, using scenarios to help increase the salience of the questions while keeping responses grounded in participant experiences (Carrol, 1999; Pommeranz, Detweiler, Wiggers, & Jonker, 2012).	100
Change "Scavenger Hunt": List as many of the changes you've seen on social platforms, big or small, that you've noticed over the last four years as you can, and anything you can remember about how you noticed them. Briefly reflect on which of these might be related to how the platform works, as well as how you feel overall about this history of change.	Assess extent of impact of change blindness (Simons & Levin, 1998; Simons & Rensink, 2005) while collecting additional data on attitudes towards platform, using a lightweight format to balance out the heavy writing of the previous and subsequent weeks.	100
Personal Journal: Tell us about your personal relationship with the platform you use the most, and how this relationship has changed over time, then briefly compare and contrast with your relationships with the other platforms you use. Accompanied by pilot change uncertainty and fatigue items.	Use contrast journals with differential self-presentation across participant's social media ecosystem (DeVito, Walker, et al., 2018) to draw comparisons between different platform environments, different attitudes towards platforms, and different behavioral outcomes.	96
Letter to the CEO: Write a letter to a social media CEO and let them know how you feel about the platform. Then complete a structured "executive summary" which highlights your asks of the CEO and the platform in the areas of content distribution, policy, and interface.	Directly elicit user needs while deepening understanding of willingness to adapt, attitude towards platform, and regular information foraging routines.	92

Table 1: ARC activities, brief justifications, and weekly participation percentages (righthand column).

Participants were paid $25 for their participation in seven weeks of research activities, and an additional $25 for completing the exit interview.

3.3   Analysis

As noted above, our overall approach to this study is based in Charmaz's work on constructivist grounded theory, which puts a premium on being responsive to one's data throughout the research process, including during data gathering (Charmaz, 2006). As such, analysis began concurrently with data collection, and continued up through the writing process.

3.3.1   Theoretical Sampling

Grounded theory principles significantly shaped data collection, both conceptually and in place. Our choice of self-presentation as an embedding context was influenced by Charmaz's advice around gaining context on a larger situation by focusing on a "basic social process" (Charmaz, 2006, p. 25). Initial activity prompts were designed with the need to establish broad background context around participants, their online settings, and their processes in mind. This kind of context is key for informing later theoretical sampling as well as assessing transferability (Charmaz, 2006; Guba & Lincoln, 1982).

During the data collection period, our priority was theoretical sampling, the heart of the grounded theory process. According to Charmaz, "theoretical sampling involves starting with data, constructing tentative ideas about the data, and then examining these ideas through further empirical inquiry" (Charmaz, 2006, p. 117). It provides much of the responsiveness and ability to focus on emergent findings which make grounded theory a

useful technique. With each week of data collection, the author and two research assistants performed a round of quick analysis involving inspecting and memoing on the new data and any emergent trends. Each of the two research assistants maintained weekly trend memos, which aimed look across all the data for each week and develop per-activity patterns, while the author maintained a set of memos linking these emerging trends across weeks, based on her own observation and reading/discussing the RA memos. The interplay between author and research assistant analysis was particularly helpful in actively balancing structural and affective concerns in analysis, as while the author's initial memoing was highly focused on folk theory structure and related behavior, RA memos were quick to point out cultural and affective factors which became important in later analysis. At this stage, the primary analysis tools were simple spreadsheets and text documents. This memoing was followed by discussion among the research team to compare analysis, put that week's emergent memos in concert with past weeks, and craft quick follow-up questions.

The author then used these memos and follow-up question responses to adjust activities in subsequent weeks, in order to be responsive to emergent themes. For example, in quick-analyzing the responses for weeks one and two, we saw evidence that there was some factor other than web skill or a traditional self-presentation correlate (e.g., self-monitoring) which explained a certain willingness or even enthusiasm to investigate changes. In order to dig further into this emergent line of inquiry, we deployed a need for cognition scale (Cacioppo & Petty, 1982) during week four, allowing us to assess if we were detecting a known property. As another example, by the time the team analyzed the week five prompt data, it had become clear that overall relationship with platform was a major factor in how people

were making adaptation decisions. As such, we adjusted the week seven prompt, which was initially tightly scoped to writing a letter to a CEO about change and how to deal with it. Instead, our deployed prompt was a broader exercise in speaking back to all aspects of the platform, allowing us to continue developing the emergent concepts which now inform section 4.3. We also added a structured "executive summary" section to the prompt in order to be sure to capture the change-related data week seven initially focused on, allowing us to put the change data in concert with the broader relational context in which it exists.

At the end of the seven weeks of prompts, all data and memos were rapidly re-analyzed and discussed among the research team in order to create individualized interview guides which covered our emergent themes in the specific context of each participant's past responses. This allowed the interviews to be guided by our emerging theories, acting as a major way of "taking control of the data," as Charmaz puts it (Charmaz, 2006), and ultimately serving as a lightweight form of member-checking, similar to (Walker & DeVito, 2020).

Throughout this process, the author was attentive to theoretical saturation as it is understood in grounded theory. In contrast to the more common usage of "saturation," usually understood as collecting data on new cases until no new patterns emerge, this entails collecting data until one stops gaining new theoretical insights by comparing these patterns across cases (Charmaz, 2006). Theoretical sampling as described here directly enabled saturation of our categories by, as Charmaz suggests, letting the comparisons-in-progress drive further data collection week-by-week. By the end of the seven-week period, clear and consistent trends had emerged, but we had not yet reached theoretical saturation, as comparisons between participants on our emerging categories still raised new, relevant

questions. However, the extensive final interview let us directly pursue these remaining questions across the entire sample. This led to a wealth of data, bringing us to a saturation point at which outstanding questions were answered, our theoretical insights from these comparisons were well-described, and no new questions which were in-scope for the study were generated by continued comparison.

Notably, the ARC framework used for this study provided an unusually fertile atmosphere for theoretical sampling. The concept was originally developed in the context of physical ethnography, and to some extent assumes sustained access to a field site (Charmaz, 2006). This can make theoretical sampling more difficult in the context of studies in which there is no physical site and often only one data collection opportunity (e.g., a single interview opportunity). However, the multi-week structure of ARC allows for a short analysis period after each round of data collection, and emergent themes are easily worked into future activities or the exit interview. While the sustained nature of an ARC has been discussed as a positive in terms of community building for participants (MacLeod et al., 2017; Maestre, Eikey, et al., 2018; Maestre, MacLeod, et al., 2018), there is an opportunity for further methodological work on using ARC as a vehicle for robust deployment of grounded theory in online studies.

3.3.2 Coding and Memoing Rounds

After data collection, the study team engaged in multiple rounds of coding and memoing to further refine our analysis, using coding to draw from and categorize participant data while using memos to track larger trends, begin developing concepts, and identify points of contradiction or thin data in both codes and prior memos. We followed Charmaz's guidelines

here, being mindful that grounded theory coding is meant to be an active process in which we constantly re-analyzed our data to challenge our own emerging views (Charmaz, 2006). We used MaxQDA as our primary analysis tool from this point forward.

Coding began in earnest with concurrent rounds of open coding by the author and one research assistant. While we did take the preliminary coding which supported theoretical sampling in the data collection period into account, we also explicitly did not hold ourselves to these structures going forward – they are best thought of as an influence on the full open coding round, rather than a determining factor. This was followed by comparative discussion and reconciliation of codes, along with memos on emergent code groupings from both the RA and author. Then, using her memos as a baseline and the RA's memos as additional context and/or challenges, the author performed a round of focused coding around important emergent themes. At this point, we also began using cross-case displays (reports on code intersections, frequencies, and content across the entire dataset) in order to help determine the applicability of focused codes to the entire participant pool. Focused coding led to some amount of additional open coding as it became clear that there was additional evidence available, which was then integrated into the ongoing focused coding round.

The entire dataset was then re-coded at the focused level by the team's most experienced research assistant, who had not been involved in coding to that point. This functioned as a double-check on the fidelity and sensibility of our codes. Discrepancies between the author's coding and research assistant's coding were memoed on and discussed in meetings, often resulting in more open coding and subsequent focused re-coding. This comparative back-and-forth between the author and one research assistant continued through the rest of the

analysis, with the assistant specifically assigned to question and double-check the author's emergent analysis against working definitions and the data itself.

At this point, so as not to privilege theory over participant experiences, two specially focused memos were developed for each participant. First, the research assistant wrote participant summaries which provided a quick reference to a participant's overall self-presentation style, attitudes, and known behaviors. Then, the author constructed per-participant *visual adaptation memos*, which brought together all adaptation-related factors into an individual adaptation narrative with easy direct access to participant data, using the MAXMaps feature in MaxQDA (see Figure 3). All subsequent theoretical coding decisions (and later decisions during the writing process) were compared against these individual memos to ensure that emerging theoretical concepts were grounded in the data and the lived experiences of participants themselves.

Finally, the author conducted a round of theoretical coding and integration, an advanced coding step in which focused codes are related to each other and, if appropriate, to existing theory (Charmaz, 2006). As the results and discussion will show, prior theory did inform our analysis at this point, but only as sensitizing concepts – essentially, starting points and inspiration, but not deterministic explanations or answers (Charmaz, 2006). Each of our top-level results sections are informed by the theories discussed in section 2, but not dictated. For example, as you will shortly read, sections 4.3 and 4.4 are certainly informed by AST, even adopting some AST terminology. However, we are not asserting that this *is* AST, rather

Strategies: Gather Exogenous Information

info seeking: search/blogs/tutorial vids etc

Strategies: Gather Endogenous Information

info seeking: experimentation

recognizes change as a constant

theory fidelity level

mechanistic fragments - explicit knowledge of factors

It's an awareness, but it was fairly latent before talking about it

P25 is a high-level theorist, although they do not see themselves tha way. They are also very aware that change is a constant

P25 is normally endo-dominant with alitttle bitt of exo backup info - in a change situation they fall back on those pathways, and add in some endo experimentation

wrong/unnessecary change (64-66)

positive response   platform is reliable/consistent

change improves safety/security   change is gradual

P25 is positive about change when it improves the platform, esp if done graddually while improving safety/ security, which refllects an overall proference for reliabilitty & consistency from platforms. P25 remains productive/responsive to addaptation even in situations where tthe platform causes some trouble (eg FB) so long as the problem stems from non-spirit-viollatioin

Posittive/accepting responses lead to faithful adapttatioin where P25 adjusts the tttypes of selfprez strategies theey already use to work in the new environment

Strategies: Play Nice With System   behavior chg: content-based strategies

behavior chg: audience/privacy setting strategies   audience/privacy tool strategies

behavior chg: search/discoverability strategies   search/discoverability strategies

Requests/Solutions (What People Want Us To Do About Change)

Better documentation at multiple levels   clear notification from platforms themselves

Specifically allow for prep/learning/ adjusting   advance notice before implementation/imp timeline

The one thing platforms could reallly do to hellp here is avoid spirit violations. Failing that, deciring on the nature of the change and if/how/ when to adapt would be easier if tthere was a lot more clear and advanced notice of changes

Platform Use Goals

identity exploration/formation

elicit social support/esteem/ solidarity

find & maintain community/ relationships

Use Case Violations

violates personal use case

community/social/identity use case violation

violates professional use case

negative reaction

excessive or incorrect moderation/ censorship

confusing/incosistent changes

wrong/unnessecary change

Traditional Spirit Violations

Purpose of platform has changed

change improves on existing use case

However, an outright negative reaction comes when use case and platform spirit are violated, e.g the Tumblr ban where the implementation via mod algos wrecked the key selfprez and community use cases, even if there are some parts of the change which actually make the platform more usable/safer

limiting/leaving

behavior chg: segmenting/seperate spaces accounts

Outright negattive reactitons lead to unfaithful appropriation (e.g. moving all now-banned content into one of many tumblr accounts, still a major violation), heavy limiting of engagement, and eventually leaving outright
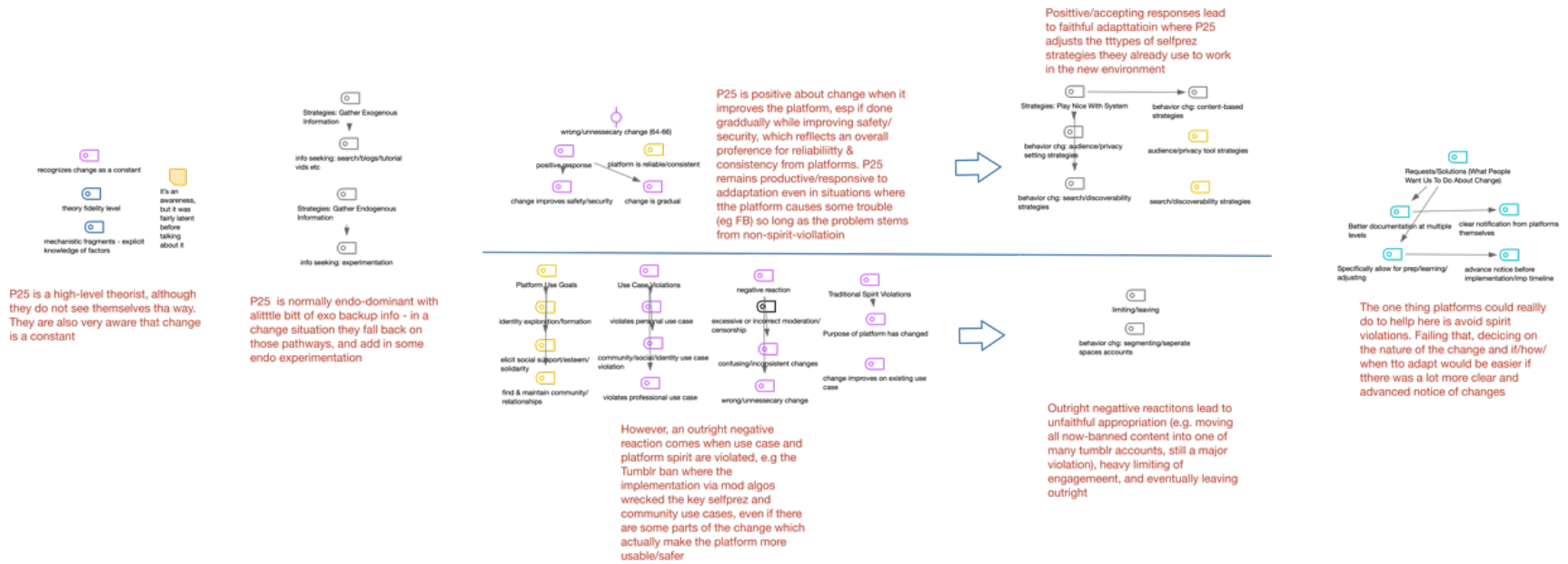
Figure 3: Example of a visual adaptation memo (here, for Participant 25), an analysis tool which lays out a participant's full adaptation pathway and related elements in order to keep high-level analysis connected with individual experience. Red text indicates narrative summaries of the raw data in the nearby coding tags.

that those theoretical concepts usefully illuminate our participants' experiences. As suggested by Charmaz, all sensitizing concepts which proved irrelevant were discarded (Charmaz, 2006). All theoretical coding was re-coded and comparatively checked, discussed, and reconciled with a research assistant as in the previous round of coding.

It is worth noting that this theoretical integration was aided by the nature of the relevant theories. AST in particular explicitly recognizes the need to adapt the lens to local circumstances in all its formulations (Cheikh-Ammar, 2018; DeSanctis & Poole, 1994; Markus & Silver, 2008; Schmitz et al., 2016). Though choice of sensitizing concepts is always contextual, theories which are built to be flexible do simplify this process.

3.3.3 Triangulation

One of the primary benefits of using an ARC approach is that it not only allows, but effectively demands triangulation of data from multiple sources, leading to a more robust and holistic understanding of the phenomena under study (MacLeod et al., 2017; Maestre, Eikey, et al., 2018; Maestre, MacLeod, et al., 2018; Prabhakar et al., 2017; Walker & DeVito, 2020). This was true throughout our analysis. All results reported below are based on triangulation across multiple ARC activities unless otherwise noted.

One particularly important example of this triangulation is how we ultimately assessed folk theorization complexity (see 4.1). Every week of prompts was assessed for key information such as theory components (factors), structural elements (e.g., asserting causation and ordering), attitude towards one's own folk theory, and general awareness of algorithmic systems. While these determinations were anchored on week two's visual

elicitation activity, the week five change scavenger hunt, and the interview follow-up, data from all seven weeks heavily informed the interpretation of these datapoints.

3.3.4 Quantitative Data

As noted in 3.2.2, we collected scale data at multiple points throughout the study. Scale data let us check interpretations of participant responses against their psychometric properties, and was attached to the individual participant memos discussed above. It also let us account for related concepts that could potentially explain our results or act as confounds, without switching the primary focus of the study to lengthy qualitative evaluation of largely psychometric concepts. Importantly, here we are not asserting significance testing or any kind of parametric statistical result; rather, these were simple checks of variance within our sample to avoid obvious confounds and better understand the composition and limitations of our sample. For example, it was crucial to be sure that not all our participants were high self-monitors, as self-monitoring ability impacts self-presentation behavior, perceptions of platforms, and folk theorization itself (DeVito, Birnholtz, et al., 2017; DeVito, Birnholtz, et al., 2018; Lennox & Wolfe, 1984). Across the board, we found no explanatory variance on any of these individual properties when examined across the data cleavages that form the basis of our the results in section 4, suggesting that, within the scope of this sample, we have avoided explanations that are simply expressions of known phenomena. However, this should not be read as certainty that these explanations can be ruled out overall, outside the context of this sample. Future work which mixes qualitative and quantitative methods at scale is required to fully understand the impact (or lack of impact) these psychometric properties may have.

Usage, self-monitoring ability, web skills and, to some extent, platform centrality have been shown to have major impacts on self-presentation behavior (DeVito, Birnholtz, et al., 2017) and even on folk theorization (DeVito, Birnholtz, et al., 2018). Overall usage (DeVito, Birnholtz, et al., 2017) ranged from 1.3 to 4.6 on a 6-point scale (M=2.8, SD=0.9), indicating that our sample has diverse use habits, but largely excludes extremely heavy users. Self-monitoring ability (Lennox & Wolfe, 1984) ranged from 2.9 to 5 on a 5-point scale (M=3.8, SD=0.6), indicating our participants range from mid-level to high self-monitoring ability and may not adequately represent those with little to no self-monitoring ability. Web skills (Hargittai & Hsieh, 2012) ranged from 3.2 to 5.0 on a 5-point scale (M=4.0, SD=0.6), suggesting that while we have some diversity of web skill, we may have inadvertently excluded low-skilled individuals. Platform centrality is a new scale created for this study by merging elements of scales used to assess degree of involvement in and attachment to platforms in previous studies (Ellison et al., 2007; Rader et al., 2018). The items can be found in Appendix B, and participants ranged from 1.7 to 6.2 on a 7-point scale (M=4.4, SD=1.2), indicating a diversity of platform centrality among participants.

Elements of queer experience may have impacts on self-presentation behavior in the context of this study (DeVito, Walker, et al., 2018). As such, and to aid in later evaluating the transferability of these results, we deployed related scales. The outness scale measures the extent to which queer people are public about their identities in various contexts (J. Mohr & Fassinger, 2000). Participants ranged from 3.3 to 6.9 on a 7-point scale (M=5.0, SD=1.1), suggesting that, while we have not represented completely closeted members of the community in this study, neither have we exclusively focused on those who are very

prominently out. We also deployed the Lesbian, Gay, and Bisexual Identity scale, which assesses multiple dimensions of queer identity and related experiences (J. J. Mohr & Kendra, 2011). Participants ranged from 2.3 to 4.3 on a 6-point scale (M=3.4, SD=0.5), suggesting our sample accounts for those with a relatively average relationship to their own queerness.

Finally, as noted above, we deployed the need for cognition scale (Cacioppo & Petty, 1982) as part of theoretical sampling. Participants ranged from 2.6 to 4.4 on a 5-point scale (M=3.6, SD=0.5), suggesting that while we accounted for most levels of need for cognition, we inadvertently excluded those who simply may not care to think through a problem like adaptation at all.

3.3.5   Positionality

All interpretation is of course informed by the positionality of the research team relative to the participants and subject matter (Charmaz, 2006). The author who designed and wrote this study, and who supervised the entire research process, is a member-researcher in the queer population under study. Specifically, she is a nonbinary transgender woman and a homoromantic bisexual. The rest of the study team included both cisgender and transgender straight women, and team members who were both cisgender and heterosexual completed a training module on working with LGBTQ+ populations before beginning work.

One important limitation to this work is directly tied to the positionality of the research team: we do not thoroughly account for the impact of race in this study. While this was not the primary focus of the study, it is important to be mindful that the author is White, as are two of the three study staff (the third being East Asian). This could have resulted in underestimating or simply not being cognizant of racial impacts, and we specifically call for

future work that investigates the impacts of race, especially as they concern attitudes towards platforms as discussed in section 4.3.

3.3.6 Transferability

Finally, a note about the broad applicability of this work. We have approached our questions by scoping ourselves to a heightened context, which could possibly result in us overfitting our conclusions to this specific context and its population. However, we believe that these results are likely to be highly transferrable to other contexts, due to the universality of self-presentation and the ubiquity of social platforms. Note that we make no claim to quantitative-style generalizability; as Guba and Lincoln write, this is not the point of qualitative work (Guba & Lincoln, 1982). Rather, the point is deep contextual interpretation, which we believe we have achieved, which allows the assessment of how directly transferrable these results are to other contexts.

We have no reason to believe that a queer population, simply by merit of being a queer population, will produce non-transferrable results so long as it is otherwise diverse. Guba and Lincoln suggest assessing transferability by assessing the context of results, using the content of thick qualitative description to determine what parts of one's results may be unique to the case under study (Guba & Lincoln, 1982). We adopt this practice, and will report out on our assessment of this work's transferability section 5.3.

4 Results

We find that everyday adaptation to changing algorithmically-driven social platforms is a process which has variable outcomes based on the level at which one is able to consider and construct useful folk theories, the extent to which both the change and platform in question honor the user's conception of platform spirit, and the extent to which users are attached to/embedded within a platform. In the following sections, we will first lay out a system for classifying folk theorization, and then use this system in order to highlight important cleavages and opportunities in the adaptation process we have identified.

4.1 Classifying Folk Theorization: Theorization Complexity Level

RQ1 asked about if and how users are actively theorizing about algorithmically-driven social platforms. All of our participants had at least basic awareness of the fact that algorithmic mechanisms were at play on modern social platforms, but beyond this the level at which the participants were theorizing varied. As we are focused on a process of adaptive reaction to change, we will concentrate here on how theories are being formed and updated, and not the theories themselves.

Ultimately, our inductive analysis pointed to five distinct levels of folk theory complexity: basic awareness, causal powers, single mechanistic fragments, multiple mechanistic fragments, and mechanistic ordering. Comparing across these groups in light of prior work in folk theorization and literacy (e.g., (DiSessa, 2001; Keil, 2012a, 2012b)), a classification system with three broad levels emerged. We call this the individual's **Theorization Complexity Level (TCL)**, defined as *the level of system complexity a user is*

aware of, takes into account, and employs to pursue their own goals when folk theorizing. Each TCL is additive, carrying the characteristics of prior levels in the hierarchy. As users move up this classification hierarchy, the way in which they are conceptualizing of algorithmic systems becomes more complex and involves more information.

4.1.1 Functional Theorists: Basic Awareness and Causal Powers

Functional folk theorists have folk theories which reflect that they are focused on the presence and effects of algorithmically-driven systems, as opposed to the causes, or inner workings of the system. The types of theories generated by functional theorists include what DeVito et al. referred to as "abstract theories," (DeVito, Gergle, et al., 2017) and the functional theorist's process reflects the associated "algorithm… as an other or interloper." There are two distinct levels of functional theorization: basic awareness and causal powers.

Folk theorization can be classified at the level of **basic awareness** if the theorizer *indicates that an algorithmic/computational system is in play on a platform, having some effect, but does not assert or reflect knowledge of a specific effect*. The algorithm, essentially, is doing *something* in the view of a functional theorist, but as Participant 13's visual exercise (Figure 4) demonstrates, exactly what it is doing remains a mystery (or, to P13, "internet magic"). 16% of participants in this study were at the level of basic awareness, and no participants lacked at least basic awareness.
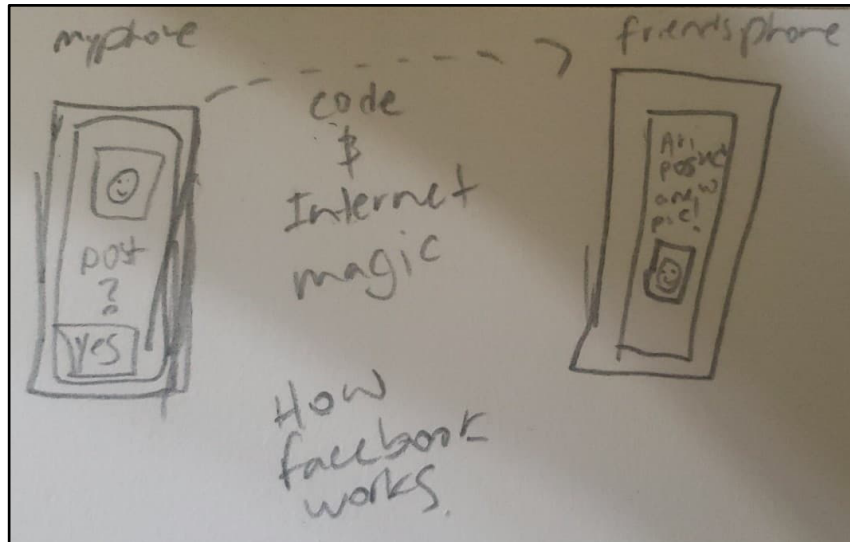
Figure 4: Participant 13's visual exercise demonstrating characteristics of basic awareness, a type of functional folk theorization.

Moving up one level, folk theorization can be classified at the level of **causal powers** if the theorizer *indicates that an algorithmic/computational system plays a causal role in a distinct outcome/outcomes*. While a basic awareness asserts *some* effect, causal powers are distinct in that they assert a *specific* effect. Participant 35's map (Figure 5) demonstrates this via direct contrast with P13's basic awareness. While P13's theory has a platform's mechanisms in a nonspecific role in the building of a feed one's friend would see with no indication of curation, P35 visually indicates (and follows up in their interview to confirm) that they see a platform mechanism as using some criteria to select which posts friends are shown and in what order. 20% of the participants in this study were at the level of causal powers.
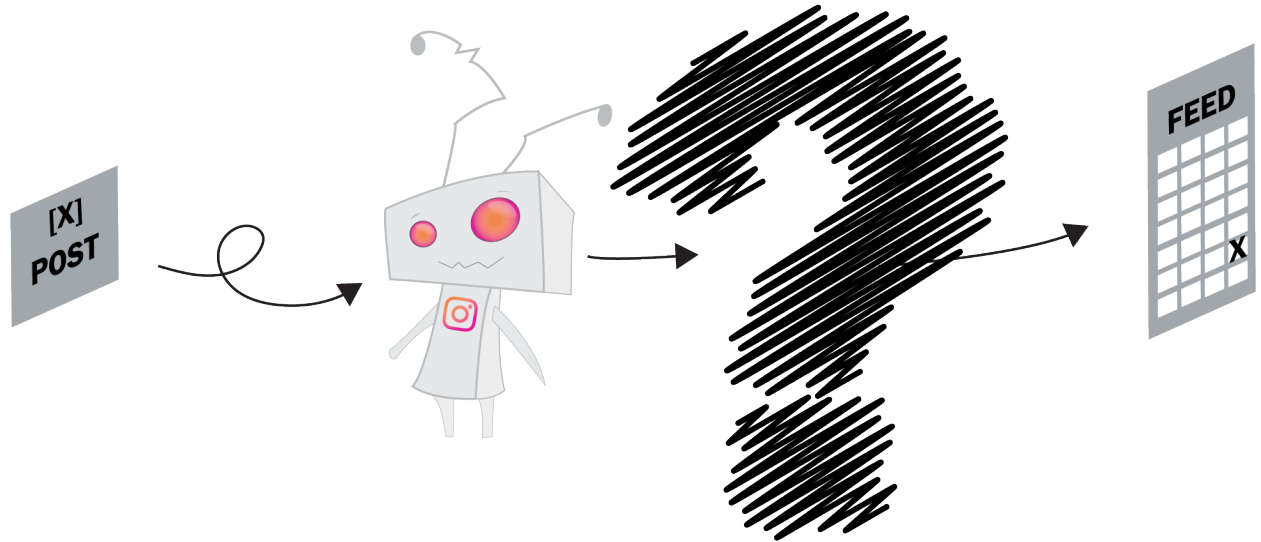
Figure 5: Participant 35's visual exercise which recognizes the impact of an algorithmic system (here, presence and position of content in a feed), but not any structural detail, characteristics of a low, causal powers level of folk theorization.

Importantly, causal powers both gets its name from and reflects a key type of pattern tracking that most folk theory work overlooks in favor of mechanism despite its demonstrated importance in assignment of causality by humans (Keil, 2012b). It also serves as a tool for operationalizing DeVito et al.'s call for more work on abstract theories (DeVito, Gergle, et al., 2017).

4.1.2   North Star Theorists: Single Mechanistic Fragment

Folk theorization can be classified at the level of **north star** or **single mechanistic fragment** when the theorist *indicates that an algorithmic/computational system plays a specific role in some on-platform determination with one specific factor as the primary causal factor in the system's decision making*. North star theorists are a minority in this study (12%), and while they largely draw on the same types of factors we see structural theorists drawing on, all their theorizing relates to one central factor. For example, as reflected in Figure 6,

Participant 17 theorizes that Instagram bases all content distribution decisions entirely on the user's prior consumption habits through a shopping metaphor.
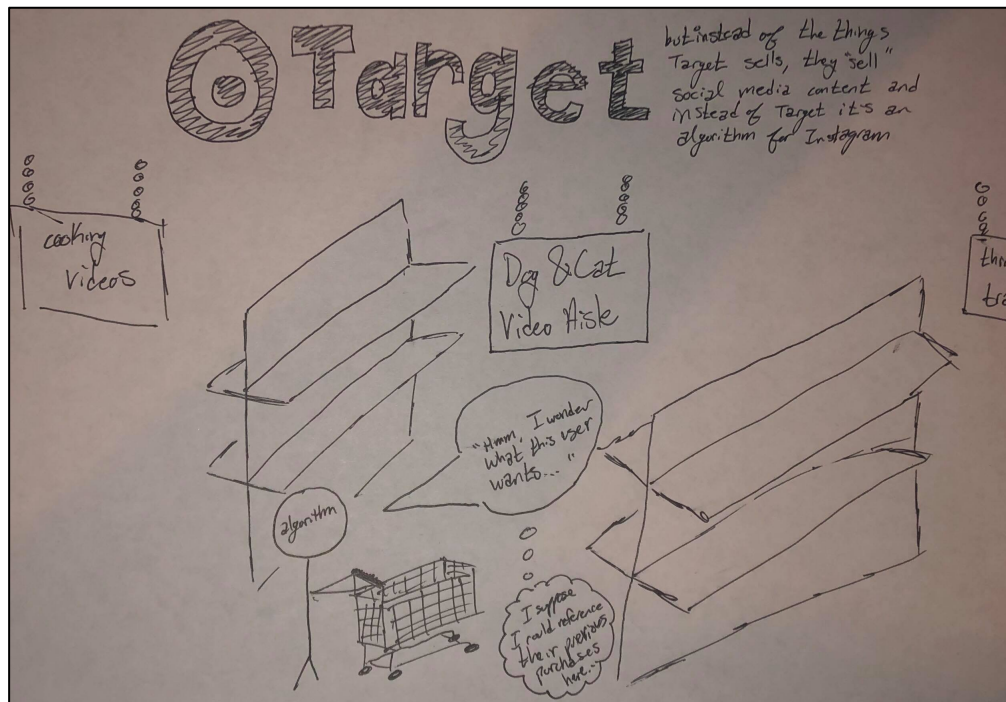
Figure 6: Participant 17's visual exercise with a narrative centered around one determining factor in algorithmically-driven content distribution (here, prior consumption habits), indicating single mechanistic fragment, or northstar, folk theorization.

4.1.3   Structural Theorists: Mechanistic Fragments and Ordering

Structural theorists dive into the causes behind the algorithmic/computational effects they encounter. These users often confidently assert effects – in the present study, structural theorists universally took algorithmic curation as given and focused on the "how" of the curation. Theories generated by structural theorists fall into the "operational theories" distinction proposed by DeVito et al. (DeVito, Gergle, et al., 2017), and encompass many of the folk theories found in prior work (e.g. (DeVito, Birnholtz, et al., 2018; Eslami et al., 2016;

French & Hancock, 2017; Rader & Gray, 2015; Rader & Slaker, 2017)). There are two distinct levels of structural theorization: mechanistic fragments and mechanistic ordering.

Folk theorization can be classified at the level of **mechanistic fragments** when the theorist *indicates that an algorithmic/computational system plays a specific causal role (or roles) on a platform, and believes that they have identified multiple specific factors/datapoints that are weighed by the system in some fashion to make decisions*. Essentially, the 36% of participants in the present study who theorized at the level of mechanistic fragments have a mental list of possible criteria for algorithmic decision making, which they then regularly shuffle, re-weight, subtract, and add to when attempting to puzzle out how platforms work. As Participant 19's cognitive map (Figure 7) demonstrates, there are often internal gradations regarding weighting of criteria – in P19's case, a distinction between the you-related and other-related factors that you/another have direct control over (comment engagement, content type, etc.), and those that can either override algorithmic mechanisms (the top stories/most recent toggle) or those that get extra weight and require demonstrated behavior over time (being a conversation starter or a trusted source).
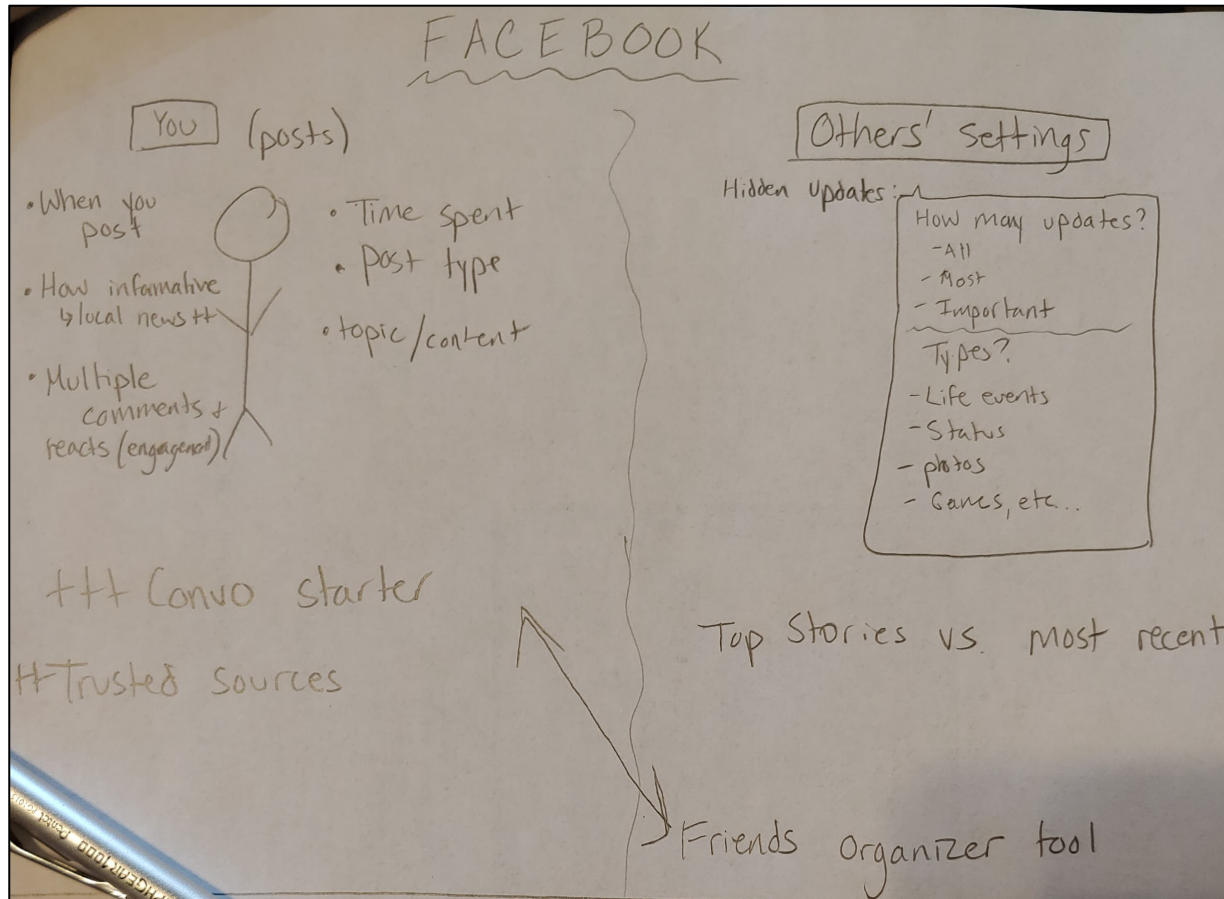
Figure 7:Participant 19's visual exercise showing multiple factors which may impact content curation, indicating structural mechanistic fragments folk theorization.

Here we see another important linkage to the cognitive science roots of folk theorization, as mechanistic fragments both represents and takes its name from Keil's account of mechanistic fragments, where knowledge of isolated components of a system (here, the factors) drive understanding which increases over time (Keil, 2012b).

Finally, at the top of the hierarchy, folk theorization can be classified at the level of **mechanistic ordering** when the theorist *indicates that an algorithmic/computational system plays a specific causal role (or roles) on a platform, and believes they have identified not only multiple specific factors/datapoints used to make decisions, but also the causal pathways*

within this set of factors in the form of either complex rankings/weightings or literal assertion of decision making pathways. This is the next step up from mechanistic fragments – as Participant 1's map shows us, the mechanistic fragments are now arranged in a way that not only gives the theorist a working theory of what criteria might be important to a platform, but also when, how, and where that criteria comes into play in actual decision-making. 16% of participants in the present study theorized on this level. As is the case with P1, these understandings are often expressed through if/then/else logic (e.g., P1's IF liked at high rate THEN post to top of feed ELSE post to niche audience based on other criteria), and often contain references to additional computational processes assumed to be in play (e.g., P1's assertion of an "image analysis and categorization" function).

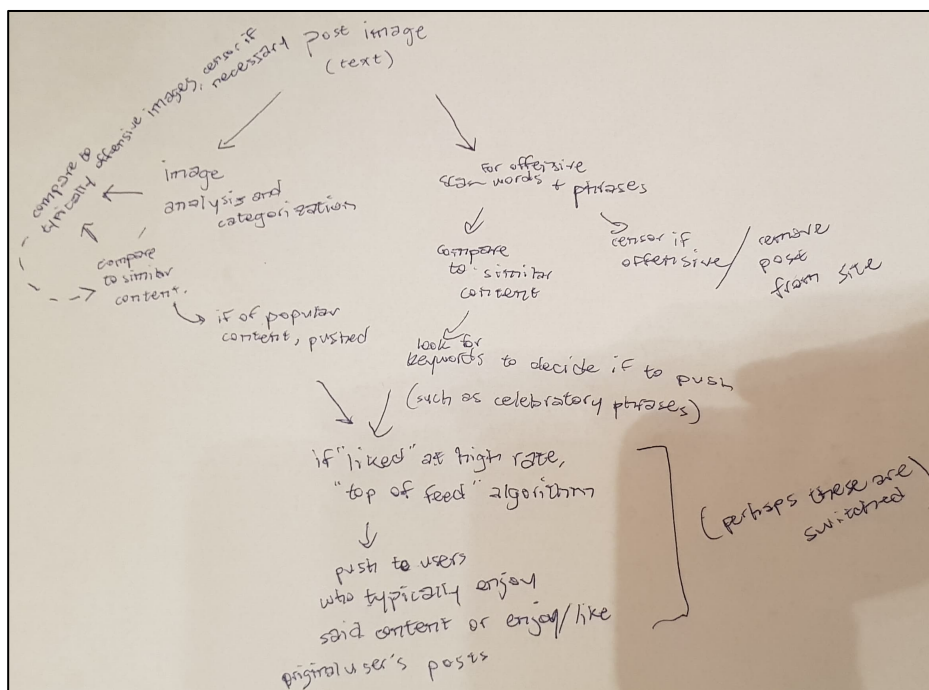*Figure 8: Participant 1's visual exercise, showing not only multiple criteria but specific causal pathways, indicating structural mechanistic ordering folk theorization.*

Theorization at the level of mechanistic ordering does not require what Keil calls "full mechanistic details." While some users theorizing at this level do certainly have the "mental blueprint" characteristic of this kind of causal pattern knowledge (Keil, 2012b), this is not necessary, as full mechanistic detail is not only rare as it is in folk theorization generally, but also perhaps impossible due to both rapid system change and the deliberately-opaque nature of platforms (Gillespie, 2014; F. Pasquale, 2015).

4.1.4   A Note on Elicitation and Interpretation

Folk theory elicitation is difficult. Functional theorists may largely talk about computational systems and causality in tacit terms which require careful probing, as the related cognitive processes (including the assignment of causal powers) can be entirely tacit (Keil, 2012b). Also, participants with more advanced theorization display the characteristics of functional theories when explaining their theory in individual contexts. This makes close attention to participant transcripts and artifacts essential in determining the level the participant is operating at, and multiple, varied elicitation methods are strongly advised.

Also important to note is the fact that higher levels of folk theorization complexity should not be interpreted as more "correct" – a mechanistic ordering folk theory can absolutely be a complex assemblage of entirely incorrect ideas, and causal powers theories can have no distinct understanding of how the platform works at all, yet still correctly identify the powers the platform exercises. As with all folk theories work, the only useful criteria for assessing the "correctness" or quality of a folk theory is if it is helping the user achieve their goals. This hierarchy is not a tool for assessing correctness; rather, it is a tool

for assessing the level of complexity with which a user is approaching their understanding of a sociotechnical system.

4.2   Noticing Change: Change Types and Tipoffs

RQ2 asked about how users notice change: to what extent they notice change, what kinds of change they notice, and how they notice these changes. Overall, the data suggests that users do, in fact, notice a good deal of change on algorithmically-driven social platforms. Users are not unaware of the constant updates that surround them; none of our participants failed to notice change entirely. A minority of participants insisted they had seen no change, and then proceeded to extensively describe changes (and had described changes prior to saying there were none), suggesting that these participants simply were not accessing their tacit knowledge in the moment, while actually having a working awareness of change. The changes users notice can be broken down into four broad categories: feature change, algorithmic change, general change, and policy change. Within each category, we see differences in amount of change noticed as well as what factors are cueing the user into the fact change has occurred, which we refer to as *tipoffs*.

4.2.1   Feature Change

A **feature change** is *a change asserted by the participant which concerns the platform's interface (including aesthetic and organizational changes) or a feature of a platform (e.g., a privacy control).* This type of change deals mostly with changes to visible options or presentation, not to behind-the-scenes process. Changes of this type can range from P19's noticing of new location-based options and bitmoji on Snapchat and P2's excitement over

Polls being added to Facebook Groups, to P8's frustration over what they perceive as a constantly-changing basic layout on YouTube and P17's casual realization that they could keep typing after 140 characters on Twitter.

Every participant talked about at least one feature change, which appears to be the most noticeable type of change overall. Feature changes represent roughly half the changes reported by high- and functional theorists. However, these groups are tipped off to feature changes differently. Structural theorists frequently notice feature change by direct endogenous use of new functionalities, and are additionally prompted by exogenous information (e.g., hearing from friends). By contrast, functional theorists stick exclusively to endogenous information and generally notice feature changes via visual interface elements, suggesting that functional theorists may generally benefit from changes being deliberately linked to visual alterations. Finally, northstar theorists notice far more feature change (and far less of other types of change) than other group, suggesting that northstar theorists may need additional feature- or interface-based cues in order to recognize other types of change, especially algorithmic change. Additionally, northstar theorists exclusively rely on endogenous information when detecting feature changes, part of a larger pattern of northstar theorists having exclusively endogenous noticing pathways, which highlights the importance of additional endogenous feature/interface-based tipoff, as northstar theorists do not turn to exogenous sources here.

4.2.2   Algorithmic Change

An **algorithmic change** is *a change asserted by the participant which concerns how one of the algorithmic systems at work on the platform operates.* Importantly, it is not necessary

that the participant explicitly recognize or label this specifically as an algorithmic change; we count a noticed change as algorithmic when the participant is talking about an automatic system process which involves user data or its effects, regardless of if the participant is aware of the fact that they are talking about an algorithm. As a useful distinction, this leads us to break algorithmic change down into explicit and implicit subtypes. *Explicit algorithmic change* is noted as being related to an algorithm/algorithmic system directly, though this awareness of an algorithm need not be specific to a single algorithm, or even the details of the algorithmic process. Rather, this distinction captures participants who notice change and assume that it is tied to an algorithmic process, such as P25:

> *"Algorithm must have changed or my friends don't get on as much? I notice I don't get nearly as many reacts, comments, shares as I used to 5 years+ ago. I notice even when I follow a page, if I don't react, comment or share something from it every so often, I start seeing less and less of it as if FB assumes I want to see less because I'm not interacting with it as much."*

While P25 clearly has a limited understanding of what algorithm is changed, and even exactly what those changes are, they do have enough knowledge to identify the algorithm as the likely site of change. Essentially, they at least know where to look should they want to try and address this change. However, explicit algorithmic change only accounts for about a third of the algorithmic change in our dataset; we see implicit algorithmic change noticed at roughly double the rate of algorithmic change. *Implicit algorithmic change* is noticed change which, from a technical perspective, is clearly a change to an algorithmic component of a platform, but which is not specifically called out as such by the participant. This reflects tacit knowledge of the presence of an algorithmic system: the participant may not be able to use this language, but they are clearly aware that a system we know to be automatic is the site of

the change in question. Frequently, the participants conceptualize of these changes in the language of "automatics" or the assertion that some decision making force is assembling content feeds in a certain, now changed, way, e.g., P29's new awareness that post time was no longer a good predictor of who would see their tweets:

> *"On Twitter, it's now possible that people are seeing my tweets at the top of their timelines even if I posted the tweet a while ago due to the 'In case you missed it' feature."*

While P29 does not specifically say that there is an algorithmic system at play, they are clearly noticing a change to an algorithmic system, and therefore essentially have a direction to move in should they wish to investigate the change, though certainly a less clear direction than one who explicitly notices algorithmic change.

Overall, all but three participants noticed some type of algorithmic change. While both functional and structural theorists recognize a robust amount of algorithmic change, structural theorists more often recognize these changes as explicitly algorithmic. Additionally, an interesting pattern emerges for functional theorists if we look just at the proportion of implicit vs explicit change noticed: causal theorists notice explicit algorithmic change more than implicit change, possibly due to their unique position as those who are reasonably sure of an algorithm's effects but none of the mechanisms behind these effects, potentially making them more likely to place blame on "the algorithm" as a generic entity instead of focusing on more a more detailed, mechanistic conception of what has changed. This is in direct contrast to the theorists with the least fidelity, basic understanding, who universally identified only implicit algorithmic change, suggesting that they may not have the language/knowledge to specifically name algorithmic change, though they still do notice

it. In direct contrast to the engagement with algorithmic change we saw with both structural and functional theorists, northstar theorists noticed very little, suggesting that they may have trouble with identifying changes as specifically algorithmic.

Additionally, participants with polished presentation styles notice more algorithmic change than those with other types, and recognize it more explicitly. This may reflect the overall attention to detail and desire to control information that is typical of the polished style, especially considering that the bulk of the changes noticed were explicit, another departure from the other styles, which all feature more implicit algorithmic change.

While endogenous tipoffs continue to be most common here, structural theorizers do notice more algorithmic changes via talking to friends and reading the news than other groups. Within endogenous information, there are also differences in focus across different TCLs. Functional theorists tend to notice algorithmic change via content-related tipoffs, e.g. changes in content distribution patterns (especially around perceived increased personalization) and what content is being rejected/moderated. Structural theorists tend to notice more via engagement- and network-related tipoffs, e.g. changes in the level of engagement they see on their posts. Northstar theorists, meanwhile, who do not notice much algorithmic change to begin with, are heavily dependent on specific expectation violations (e.g., the expectation of a chronological feed), notice few other endogenous tipoffs, and lack alternate, exogenous noticing pathways entirely. This lack of options may contribute to the northstar difficulty with algorithmic change.

4.2.3   General Change

General change is *change that is not specifically tied to any aspect of the platform; rather, it is a broad sense that the platform is changing, often expressed in relatively vague terms*, e.g. P11's repeated noting that Facebook has "evolved" in the time they have used the platform. While they are not, in these moments, noting a specific change, they are noting an overall trend of change. Frequently, this is tied to a sense that the overall values of the platform, or at least the current business focus of the platform, has shifted, and blamed on an increase in the overall scale of the platform. For example, when asked about their history with Facebook, P3 noted that recent changes to the platform overall have made it more of an "endeavor to make money," suggesting that this is because "users have grown to include most of the people with internet access." Importantly, while every single participant talked about general change at some point, no participant exclusively noticed general change – all were able to speak on more specific changes at some point. Across the board, most general change was noted by long-term platform observation, with structural theorists also consulting exogenous sources.

4.2.4   Policy Change

Policy change is *change pertaining to how a platform chooses to draw boundaries and take action at a high level (e.g., company-wide or platform-wide for a platform owner).* Importantly, this type of noticed change is specifically about policy, not implementation details. For example, P27 noted policy change around content moderation on Facebook:

> *"Things I have noticed is the increase in acceptability of transphobia and sexism. The moderation guidelines are not appropriately enforced and many transgender people still get their accounts blocked for using the correct name.*

Women in general get a horrible amount of threatening messages not to mention censorship"

The important distinction here is that P27 is talking about the platform's high-level decision to enforce or only selectively enforce certain parts of their public moderation guidelines, up to and including the decision to put systems in place to enforce/not enforce these guidelines. Had P27 instead spoke specifically of noticing how Facebook's automatic content recognition and filtration systems seem to be allowing more transphobic/sexist comments to appear in the feed while flagging more trans people regarding the real name policy, this would be better classified as implicit algorithmic change, as the change is being noticed at an implementation level. Policy change is the least noticed type of change, and was only noted by slightly under half the participants. Across the board, most policy change was noted by explicit expectation violations, here around content moderation and censorship.

4.2.5   Barriers to Noticing Change

Though the participants were largely aware of change, and have had some success overall identifying specific changes, it is unlikely that all possible changes were noticed. Additionally, three participants (3, 16, and 31) did not notice algorithmic change specifically. Clearly, there are still barriers in place to noticing change. One of these barriers may be an issue of change type conflation. At a broad level, our data suggests that users may essentially be "getting their wires crossed" when it comes to noticing different types of change, likely due to the fact that some kinds of change are simply more salient and easier to notice for the average user. At multiple points in the study, but especially in week four's scenario exercise and week five's diary exercise, we prompted users to recount specific types of changes.

While, as noted above, users did notice all types of changes, they often bucketed them in a way that suggests that many changes, of all types, are understood as feature changes by users. When asked about change generally, features changes were by far the most common type described; when asked about feature change specifically, most changes listed were feature change, but a notable minority were actually implicit algorithmic changes. When asked about algorithmic change specifically, slightly under half the changes listed were in fact feature change, outstripping explicit algorithmic change. One possible explanation is that feature change is simply more salient overall due to its upfront and often large-scale and visual nature, compared to the potentially change-blindness-inducing nature of algorithmic change (Simons & Levin, 1998; Simons & Rensink, 2005), and therefore may "crowd out" algorithmic change in some attribution cases.

4.3   Platform Spirit and the Adaptation Decision: Adapt, Limit, or Leave

RQ3 asked if and how users choose to adapt to platform change. We find that users largely see change as labor, and make a decision about if they should put the labor in to adapt, or simply limit their participation or leave a platform largely based on if they see the change and, more broadly, the platform's current behavior, as honoring or violating their perception of the platform's spirit.

Overwhelmingly, if a platform is perceived as being faithful to a user's understanding of the platform's spirit, they will attempt to adapt. As we will discuss in the next section, they may fail at this adaptation, but they will at least make some kind of attempt. If the platform is perceived as being unfaithful, however, we see different types of choices made across

different levels of folk theorization. In order to better illustrate these differences, we will follow one exemplar case through the decision-making process for each level.

4.3.1 Adaptation as Labor

Across the board, our participants recognized adaptation as a form of labor they are effectively being asked to do to successfully continue their use of the platform. This labor and the associated user concerns stem from not only the work of adaptation, but the conditions under which adaptation happens. For example, the unstable nature of platforms and constant need to adapt is a large amount of labor for many, leading to an expressed sense of exasperation and some level of jadedness about if this effort will last. Participant 8 expressed this clearly: when asked during the week four prompt how they react to news change is coming, they said "My immediate gut reaction is 'oh no, not again,'" which they then further explained in the follow-up interview:

> *"It's usually a feeling of needing to adapt to something that is most likely going to be obsolete in a short time later. Sometimes the change is done so unannounced that it's also a mix of 'great, now I need to learn how to navigate this site I had already learned a lot of ins and outs of all over again.'"*

P8 has already sunk time into learning a platform, and is not excited to contribute more of their time just to learn to keep doing what they are already doing. Participant 20 said they feel similarly, and even have stricter standards than P8: changes get an hour of attempting to adapt, maximum, as they feel that their "time is valuable" and anything past an hour is not a good enough use of their time.

This frustration regarding being asked to do adaptation labor is sometimes also intensified by the fact that not all users accept all changes as necessary, and some even prove

to be counterproductive, leading to frustration over the need to adapt to unnecessary changes, as Participant 16 expressed:

> *"At the risk of sounding like an eighty year old grandma, there is far too much change on this site. I do generally believe that updates are good. Changing major features every three weeks, however, is not ..... too much change leads to overcomplicating very straightforward tasks. Please keep in mind that the wheel does not need to be reinvented"*

Even for those participants who initially desire to adapt, the fact that this is labor eventually catches up to them. Participant 13, for example, reported a pattern of trying to adapt turning into complaining and eventually into losing interest due to the frequency and magnitude of change. Participant 35 reported a similar pattern, summing things up well:

> *"...constant change makes me check it out at first but then I get tired of the changes that happen so often that I decrease my presence."*

The fact that users see adaptation as labor sets up a choice to put this labor in or not – a choice that is largely based on what a change does to a user's perception of their relationship with the platform as they understand it.

4.3.2   Functional Theorizers

Functional theorizers attempt to faithfully adapt if a change is faithful to perceived platform spirit, and tend to choose not to put labor in and adapt if changes violate perceived platform spirit. If the platform in question is not an essential part of the user's life, they generally leave entirely. If a platform is crucial, they heavily limit their participation. As an illustration, we can examine the case of Participant 15. P15 is working at a causal powers level of folk theorization, knowing that some part of each platform picks what one will see on a feed, but not how or what factors will influence this curation. When P15 encounters a

change that is faithful to platform spirit, they choose to attempt to adapt – in fact, so long as changes improve the platform, are not overwhelmingly frequent, and are well-communicated, they're quite accepting of and game to try and adapt to change. P15 notes:

It's not that social media platforms shouldn't innovate; they should innovate consistently and not often so that users get the best experience and still feel comfortable posting and sharing.

However, some major platforms have made changes that bother P15. Some directly violate the core use case P15 has for the platform, e.g. Tumblr:

> *Tumblr has honestly always been the site for sexuality, sexual freedom, and sexual expression, that is, until its recent ban on pornography, nudity, and female-presenting nipples. I know that many people, not just LGBT folk turned to this platform to figure themselves out or to connect with others with their interests.*

P15 was one of these people trying to use the platform to connect with others and perform important identity exploration, and Tumblr introducing new algorithmic curation standards around content crucial to the LGBTQ+ community made that almost impossible for P15, who ultimately left Tumblr entirely instead of trying to adapt. There was no point to adaptation – the core use case for the platform was gone.

P15 has slightly different concerns with Facebook's repeated changes, noting that Facebook has shifted away from what P15 sees as their core purpose:

> *It seems to have lost touch with its user-base and its mission, to connect people.*

More specifically, P15 sees changes which increase the amount of curation and targeting on the platform, which violate both P15's understanding of what purpose Facebook is meant to serve (as changes have made it "a lot less user-focused and more revenue-focused") and

their understanding of what place Facebook fills in their life and in their self-presentation

activities as a person with a heavily authentic self-presentation style:

> *"I began to notice my feed being more "curated" than I really wanted and began to limit my use"*

This increased curation made P15's use cases around sharing interests more difficult,

and also requires more labor in terms of playing to the algorithm with one's content, which

conflicts with P15's authentic self-presentation style. P15 noted they would have liked to

leave Facebook entirely after these unwanted changes, but has settled on a strategy of

heavily limiting their participation because they recognize Facebook as an essential platform

with so many crucial connections that they can not leave without difficulty. As they noted,

unhappily:

> *"The platform everyone hates but everyone uses. You have it because of its prevalence, not because you want it."*

4.3.3   Northstar Theorists

Northstar theorists attempt to adapt to changes that are faithful to platform spirit. In

cases of changes that are not faithful to platform spirit, they limit and sometimes leave,

similar to functional theorists but more hesitantly or in a piecemeal fashion, often

distributing the decision to limit or leave over time. Participant 17 is a northstar theorist –

specifically, they believe that content distribution on platforms is entirely tied to one's own

past content consumption behavior. When faced with change on Twitter and Snapchat, P17

was not happy, as the changes contributed to Twitter being an "annoying and ridiculous"

platform and making Snapchat a platform that is "definitely always there for me (except for

when it updates and I have no idea how to use it anymore)." Despite these reservations, P17

tries to adapt to these changes, as these platforms have stayed true to their use cases throughout the changes – Twitter's primary use for P17 is self-expression and changes have not harmed that use, and Snapchat's primary use is building and maintaining emotionally-important connections with distant friends, which have also not been harmed despite confusing changes overall. So long as use case and spirit are maintained, P17 attempts to adapt through significant annoyance – though, as we will see in the next section, they are rarely successful.

By contrast, when a platform starts to have spirit and use case violations, P17 becomes much more likely to want to limit their participation or leave, often "hanging on" to a platform as long as they can before ultimately leaving. YouTube, for example, first violated P17's sharing interests use case by (to their perception) changing content distribution to require ad buys and monetization, sidestepping what P17 assumes to be the only real way of working with the curation algorithm (being similar to content your users already consume) and creating a "crisis of access." As P17 notes, that's not just a violation of their personal use case, but a violation of what YouTube is actively promising as its mission:

> *"YouTube still has the same mission as before, that idea that anyone with an idea can go on and share it, but the commercialization has come to change the platform and the content a whole lot."*

After this, P17 was directly impacted by what they see as changes to how YouTube censors content, specifically P17's LGBTQ+-related content, which they interpreted as damaging to their use case, but also, more importantly, a violation of platform spirit and the platform's wider responsibilities to society:

> *YouTube is also having a crisis of content, where objectively racist, sexist, homophobic, transphobic, xenophobic, or simply ignorant content that betrays*

> *fact is allowed to be published while producers who stay true to facts and human rights are punished for touching on subjects deemed too strong, mature, risque, or touchy.*

YouTube is still a crucial platform for P17 and their core use case still works, if unreliably, so they have not left, but have been limiting their posting. A similar set of problems also occurred on Tumblr for P17 – when the core use case there was exhausted, they simply left the platform.

4.3.4 Structural Theorists

Structural theorizers largely faithfully adapt if a change respects the platform's perceived spirit, and bifurcate into two subgroups when changes violate perceived platform spirit – one group limits and leaves, while another subgroup with distinct characteristics stays and adapts.

Participant 31 theorizes at the mechanistic fragments level, and when they encounter changes that are faithful to platform spirit, they simply and easily adapt. They are not always happy about adapting and have many negative things to say about platforms they've adapted to, but ultimately, so long as platform spirit is honored, they find a way to adapt. For example, P31 sees constant, haphazard updates on Tumblr which seem to not reflect user input, characterizing the platform as "disorganized at best but more often chaotic." And yet, despite frequent annoyance, P31 adapts to changes from what is now their most crucial platform. P31 sees Tumblr as having a very distinct purpose:

> *"It's meant to be used to connect people and create community while also being able to declare who you are (or at the very least, give a safe space for exploration and discovery)."*

Despite being annoying, Tumblr still fulfills what P31 sees as their core purpose, not making changes that, in P31's opinion, damage that sense of safety. This fulfills Tumblr's perceived commitment to the community and also enables P31's personal efforts to educate on social justice, which require such a safe space. This is to the extent that P31 says they "don't feel as safe posting more personal feelings or thoughts on other platforms." As such, P31 adapts. Notably, P31 also said it is helpful that Tumblr clearly acknowledges issues with their changes – a direct contrast to other platforms such as Facebook.

There is much P31 liked about Facebook: they view it as consistent, easy to use, and full of "a great number of features that help people." It has broad audiences, and could potentially be an excellent place to educate. However, P31 now sees Facebook as engaged in what they perceive as a large-scale spirit violation enacted through Facebook's moderation systems:

> *"It is more likely for individuals from marginalized groups to be suspended when they defend their right to not be harassed for their very existence. My safety in using Facebook would increase if Facebook took a stand against individuals that promote hate speech against protected groups."*

For P31, Facebook is not living up to its responsibilities as a platform, and either changes to the moderation systems or a lack of appropriate changes to the moderation systems has made it a particularly unsafe space for marginalized people. Notably, they also do not do enough to address why the platform behaves this way, P31 notes:

> *"It undermines my confidence in the platform as a whole if they aren't transparent with something so vital to the safety of their users."*

As a result, P31 has severely "curtailed" their posting to Facebook.

Interestingly, a subgroup of structural folk theorists behave differently than the rest when faced with platform spirit violations. For example, Participant 21 theorizes at a

mechanistic fragments level, and behaves similarly to P31 when faced with a change that is faithful to platform spirit. This is true even in cases where changes are confusing and inconsistent. However, as a member of this unique subgroup, when faced with changes unfaithful to a platform's perceived spirit, P21 does not limit or leave – rather, they adapt. For example, P21 considers Facebook to be a crucial platform for connecting with people who actually know them, describing it as their "most social social platform." However, P21 believes that a change to Facebook's curation systems represented a direct threat to their social use case:

> *"When Facebook said it was going to choose FOR ME who out of my friends were worthy to be seen on my timeline, I tried to use that against it."*

P21, despite encountering the type of use case violation which causes most to either leave the platform or limit their participation, stayed and adapted – specifically, via gaming the system, which we will return to in the next section when discussing unfaithful adaptation.

These unfaithful adaptors share a distinct set of traits when compared to other structural theorizers that do not engage in unfaithful adaptation behavior. They generally rely more on endogenous information for theorization, especially direct, sustained observation of platforms. When they do rely on exogenous information, it is from news articles, whereas structural adaptors in general usually have a broader base including community members. They also expressed more opinions about platforms, both negative and positive. In essence, this appears to be a group of users who are closer to the platform, both in terms of caring about it and feeling a sense of ownership, as well as ability to adapt simply by studying the platform.

4.4   Adaptation: Foraging, Faithfulness, and Resistance

RQ4 asked how users actually adapt, both informationally and behaviorally. Again, this varies by TCL, with functional theorizers making small adjustments based on low levels of information, structural theorizers making both faithful and unfaithful adaptations based on expanded information networks and experimental behavior, and northstar theorists largely idling out of the entire process. What is universal is where behavioral change starts: we saw no instances of radical new behaviors being introduced, but rather various (and variously successful) gradations of adjusting or otherwise updating one's existing self-presentation tactics and adopting tactics similar to one's own existing repertoire.

4.4.1   Functional Theorizers

When participants theorizing about platforms at a functional attempt to adapt, the result is generally a small amount of additional information foraging and small adjustments to existing self-presentation tactics. In a very real sense, functional theorizers are not so much *adapting to* the algorithmic systems on a platform, but rather *adjusting around* the algorithmic systems by using limited knowledge to tweak ways of behavior that have worked for them previously. They are also doing so under stress, and with no guarantee of success.

The foraging step for functional theorizers is best characterized as limited. Commonly, participants at this level took a watch and wait approach, increasing their endogenous information via observation of the platform. For some participants, such as P34, this includes temporary limiting of participation:

> *I might avoid posting for a while until I understand better.*

Others engaged in minor, very scoped on-platform testing behavior, but were hesitant. P20, for example, "plays around" with posts only after some time has passed since they noticed he change, after they have had the chance to watch and wait and make sure their playing around will not immediately lead to negative consequences. This testing behavior is often quite scoped; P20 and P8, for example, put time limits on their testing and exploration, as P8 explains:

> *I mainly try to spend an hour or so of my free time to tackle navigating the new updates, mainly to figure out how to find content or information that I regularly engaged with prior to the update.*

This direct endogenous testing and observation, light as it may be, appears to be crucial for functional theorists. However, as P8 continues, exogenous sources become useful in difficult-to-parse change situations:

> *"I mostly learn better through discovery on my own experiences, and I usually seek others help when I'm struggling with finding things"*

This pattern of gathering minimal additional information by slightly expanding one's usual sources and testing behavior is typical with functional theorizers, and can run both ways. P35, for example, consults friends in online groups and then does some minimal on-platform testing to verify what their friends have told them. Functional theorizers are approaching change with more knowledge than they had before – but only a small amount more.

Once they have foraged, functional theorizers move on to actual behavioral adaptation, but notably do so with a distinct sense of resignation. For example, P4 refers to the "continuous cycle of updates" as "background noise" – just a fact they will have to deal with. P8, while recounting their basic adaptation strategy, illustrates the general attitude well:

I would initially be confused. I'd look at what changed, see what new options are available and which ones are gone and maybe test them out as I post. Alternatively, I would just try to trudge along as normal because sometimes social media can't keep the same interface for a year.

P8 not only captures the attitude, but an important point about functional theorists generally: adaptation is not guaranteed. Sometimes functional theorizers do just have to trudge along or else eventually limit their participation or leave, even if they have made the decision to try to adapt. P34, for example, does very little to adapt, very lightly attempting to tweak their content. A combination of low ability to theorize in order to adapt and an authentic presentation style that is damaged by going much further than they already do with their go-to content-related self-presentation tactics leaves P34 in a position where they usually try to adapt, but ultimately fail and heavily limit their participation.

For those that do manage to adapt, the focus is not actually on adapting directly to the algorithm. Only one participant actively spoke in terms of adapting to an algorithm specifically; the rest of the functional theorizers talked in terms of features (e.g., P20), options (e.g., P34), and privacy settings (e.g., P35). While all of these relate to the algorithmic system, and can be read as a proxy for it, it was clear that participants at this level were not conceptualizing the algorithm specifically as what needs to be accounted for.

Instead of focusing on understanding and accounting for the algorithm directly, functional theorizers appear to be thinking in terms of adjusting traditional self-presentation tactics. For example, P13 heavily leans on privacy settings as a self-presentation tactic, and has adopted a practice of regularly checking and tweaking these controls to deal with change on a per-post basis. Similarly, P8 is used to using content-based strategies where they adjust the content of their posts to manage their self-presentation, and adapted to changes which

reduced their perceived audience via cycling though new content types, temporarily trying to just repost, and posting more frequently in an effort to be more appealing. Ultimately, the adaptation behavior observed for functional theorizers is best characterized as lightly tweaking existing behavior based on a small amount of new information, with failure as a possibility.

4.4.2   Northstar Theorizers

When participants theorizing about platforms at the northstar level attempt to adapt, not much happens at all. That is not to say northstars do not try to adapt at all, but both information foraging and change in behavior is minimal, and may ultimately fail. For example, P17 noticed changes to how reblogs on Tumblr were displayed and performed, threatening their core use case, as for them Tumblr is mostly communication via reblog. P17 initially tried to adapt, encountered trouble, switched to limiting and, ultimately, could not resolve the trouble and left the platform. It was not that P17 did not want to adapt, it is that they could not. It is possible this relates to the minimal amount of additional foraging P17 engaged in, relying only on their existing endogenous "playing around" and the addition of a few blogs.

This minimal amount of information foraging appears to drive similar minimal adaptation behavior for other northstar theorists, such as P29. P29 becomes more cautious and hesitant when faced with change:

> *I was pretty confused and left it alone for a few days and asked someone what was up.*

P29 normally endogenously observes their favored platforms as their primary source of theorization information, and here pauses this strategy out of caution, eventually turning to a friend as a last resort. This is also typical – when northstar theorists expand their endogenous sources, it is largely because they are out of choices.

P29's minimal foraging sets up minimal adaptations along familiar lines. P29 normally uses privacy tools as their primary self-presentation tactic, and usually attempts to adapt to change by tweaking these settings, as opposed to trying any novel or large-scale tactics. This also avoids alternative tactics that would violate their own authentic presentation strategy (e.g., many content-based tactics).

Ultimately, the northstar theorists would, as P27 notes, like to "roll with the changes and don't think too much of it," but either find doing so difficult or are not adequately motivated. This may let them minorly adjust to small changes and problems, but it leaves them at a loss to act when changes are bigger. P27 was clear that they think they can adjust to smaller changes, but with bigger changes they are much less confident. Ultimately, the best word to characterize foraging and adaptation behavior for northstars is "minimal."

4.4.3   Structural Theorizers

Participants theorizing about platforms at a structural level adapt in two distinct patterns. As noted earlier, a subgroup of structural theorizers are the only group of participants to actively try adapting instead of limiting or leaving in a situation involving platform spirit violations. However, all structural theorizers are adapting directly to algorithmic issues by making substantial adjustments to their existing self-presentation

tactics, including reprioritization of those tactics. They are largely successful at these adaptation attempts.

When foraging for information to respond to change, both types of structural theorizer undertake expansion of their sources to more of an extent than functional theorizers, and do so across both endogenous and exogenous sources. The difference lies in what sources are ultimately favored during this expansion. Faithful adaptors tend to favor exogenous information, or stay balanced between endogenous and exogenous. For example, to help adapt, P9 expands their information sources from personal sources (e.g., talking to/asking friends) to also include official sources such as platform help documentation. P10, meanwhile, steadily ramps up the volume of their foraging across both source types, as do P12 and P19, while P31 not only accelerates both types of foraging, but then explicitly starts to use their expanded experimentation as a tool to verify information from their expanded exogenous sources.

By contrast, unfaithful adaptors tend to double down on endogenous information. This includes increasing direct observation of the platform, but it more heavily leans on experimentation-type behavior across the board. This is not to say that faithful adaptors at this TCL do not experiment – they do, at a higher level quite distinct from the small-scale testing we see in functional theorizers. However, unfaithful adaptors go beyond this, with more and more elaborate experimentation that may involve multiple people. For example, P2 recruited friends for their experiment to test out their folk theory that different reactions on Facebook (e.g., like, love, anger, laughter, etc.) had different impacts on content distribution:

> *I got 9 friends to join me in an experiment. We selected 5 outside our click of 10 friends, 5 pages we commonly liked and 5 groups we all shared. Three of us would only like content from all 3 categories. 3 of us would only love content, 3 of us would react as natural from all emotional options, and 1 would not react at all. We charted how often the content from the designated pages, groups and friends came up in our feed, and found that the loving content positively increased frequency on newsfeeds.*

While not all experimentation by unfaithful adaptors is this elaborate, it is only unfaithful adaptors that go to these lengths, and only unfaithful adaptors that approach such experimentation with an overall attitude of excitement.

When it comes to actual adaptation behavior, the faithful and unfaithful more thoroughly diverge, but the core difference between high- and low- level theorists generally is that structural theorists are adapting in ways that directly address what they think is happening algorithmically on a platform. For example, P12 theorizes at the level of mechanistic fragments, believing in several different factors which could impact algorithmic decision-making. This includes network analysis as "some way of connecting me to other people like me on social media." When P12 encountered a change in content distribution that made it seem like celebrity and influencer status was a crucial factor in decision-making, P12 began adjusting their own network to try and clearly communicate to the platform that they were not like and did not want to see or be grouped like influencers. This is a response directly to algorithmic change (here, a switch to a non-chronological feed suddenly boosting influencers) which rearranges components of P12's existing folk theory in order to inform an adaptation strategy, typical of structural theorizers.

While this direct reaction to the algorithm usually results in adaptations specific to the perceived algorithmic change, and both faithful and unfaithful adaptors instantiate these

adaptations as extensions of existing self-presentation tactics when platform spirit is being honored, unfaithful adaptors behave differently when faced with situations that violate platform spirit. These participants take their folk theory and, effectively, fight back against the platform. For example, who P21 sees being able to connect with the entire community they have built on Facebook as a core part of the platform's spirit, believed that Facebook had switched to prioritizing content distribution between one's most interacted-with friends, a violation of that perceived spirit. In response, P21 started searching for a wide variety of friends, including those they did not frequently interact with, and liking many oof their past post, essentially sending counter-signals to the algorithm to counteract the new curation style. Others adapted in thematically similar but situationally unique ways: P1 saw undue boosting of influencer content and started to use their account in an influenceresque "spam" style as a counter. P7 went even further, asking their audience to directly comment on posts to help counter a perceived change towards favoring content with heavy interaction, which violated P7's education and activism-focused use case.

4.4.4   Barriers to Adaptation

The adaptation pathways described above point to barriers to adaptation generally, especially for functional theorizers, who largely appear to be held up by inadequate baseline understanding of the platform to work from. However, we also directly asked participants what would make things easier for them during our week seven activity and regularly asked follow-up questions around what would have been helpful in actual adaptation scenarios participants described. While some barriers (e.g., lack of adequate advance notice of change leading to lack of time to rapidly adapt) were universal, we also saw variance across TCLs,

suggesting a need to carefully tailor interventions based on the level on which a user is already thinking about a platform. For example, both functional and structural theorizers see lack of information as a barrier; however, why they see it as a barrier varies. Functional theorizers are more concerned with the complexity of information, as P13 notes:

> *"It would be nice if it was written in easy to understand language and not a large wall of text."*

Functional theorizers have a limited capacity to integrate complex information into relatively simple theories, so information that is too complex and detailed becomes both overwhelming and discouraging. By contrast, structural theorizers do not see complex information as a barrier, but are instead more concerned with the organization of this information, including how easy it is to find relevant, and avoid irrelevant, information, as P10 describes:

> *"…a forum or location being dedicated specifically to updates and changes. A few places have 'help and info centers' but they're often kind of difficult to maneuver so it would be nice to have better search functionality and a 'TLDR' section that sums up the really complex info that might pertain to flowery legal jargon etc.… the main thing now is that a lot of [adaptation] is speculative or trial and error. It would be great if it were explicit."*

For the structural theorizer, the barrier is quite different: no efficient ways to find and navigate the complex information they have no trouble integrating into their theories. Additionally, structural theorizers pointed out one specific piece of missing information that they find makes it more difficult to adapt: the "why" behind the changes.

Another area with near-universal agreement at a high level but important differences per TCL is specificity of information to an exact change situation. Everyone would like change information to be more specific, but we see a difference in degree. Both structural and

functional theorizers talk about how information is not specific enough to how a change will impact them, but mostly in terms of a lack of practical ways to see how an updated system will act in practice in the service of their own sensemaking. Northstar theorizers, however, are largely not interested in more specific information for sensemaking; rather, they are interested in instructions, as P29 notes:

> *"It would be helpful if I received concrete dates on when changes are implemented and exactly how they are going to impact my experience as an ordinary user."*

This may relate to another trend: northstar theorizers had the least to say about both barriers and possible solutions, suggesting that without concrete, situation-specific detail, northstars struggle to adapt as well as to figure out why they are struggling.

5 Discussion

In this study, we have contributed a new system for classifying user folk theorization in the context of social platforms, as well as a set of what we call **adaptation pathways,** for the context of self-presentation via said platforms, summarized in Table 2. While each user's ability and path to adaptation will to some extent be unique, better understanding these adaptation pathways in the context of how the user is theorizing about the platform gives us new insight into both the process of folk theorization and how it impacts self-presentation. In this section, we will cover the implications of this study for algorithmic literacy, for platforms, and for the LGBTQ+ community, but will first briefly review three contributions to ongoing work on folk theorization and self-presentation: the establishment of an interplay between sensemaking and foraging, the integration of folk theorization complexity into our models of both processes, and a revised concept of platform spirit and how it impacts both processes.

Theorization Complexity Level (TCL)		Minimum Demonstrated Theory Complexity	Simplified Example	Common Info Strategy	Common Adaptation Behavior	
					Spirit Honored	Spirit Violated
Structural	*Mechanistic Ordering*	Indicates the theorizer is aware of the algorithmic process and believes they have identified multiple criteria by which it makes decisions as well as causal ordering within this criteria (e.g., a specified decision-making pathway or complex rankings of criteria).	Platform decides what content to show me by filtering to only posts from close friends, and then from that pool chooses based on how often I've commented on this person's posts (important) and how many likes the new post has (less important).	Broad expansion & addition of exogenous sources, significant, often creative experimentation	Continuance, faithful adaptation directed at algorithmic components specifically via significant, often experimental, modification of prior self-presentation tactics	If platform unessential, leave. If platform essential, severely limit participation If heavily attached to platform, unfaithfully adapt
	Mechanistic Fragments	Indicates the theorizer is aware of the algorithmic process and believes they have identified multiple criteria by which it makes decisions, which may vary in weight.	Platform considers the amount of likes on a post, what time it was posted, and how close I am to the person that posted it when deciding what to show me.			
North Star	*Single Fragment*	Indicates the theorizer is aware of the algorithmic process and believes they have identified the one key criterion by which it makes decisions.	Platform decides what content to show me based on how many likes the content already has.	Minimal expansion of existing endogenous & exogenous sources	Minimal adaptation overall, minor, often hesitant changes to existing tactics if simple/not overwhelming, limiting/leaving if complex	
Functional	*Causal Powers*	Indicates the theorizer is aware that the algorithmic process has some specific causal effect.	Platform picks what kind of content to show me on my feed.	Limited expansion and addition of exogenous info & limited testing behavior	Continuance, non-algorithm-specific adjustment of existing self-presentation tactics	If platform unessential, leave. If essential, limiting of participation
	Basic Awareness	Indicates that the theorizer is aware of the presence of an on-platform algorithmic / computational mechanisms with nonspecific effect.	Platform has some systems that make decisions for you.			

Table 2: Theorization Complexity Levels and Related Adaptation Pathways in the Context of Self-Presentation on Algorithmically-Driven Social Platforms

First, this study has updated the model of folk theorization in this context to account for the change over time which is endemic to platforms (Gillespie, 2014). While we do not account for users who have no algorithmic awareness (potentially a sizeable group (Cotter & Reisdorf, 2020; Rader & Gray, 2015)), we do find that those who are aware of algorithmic influence do notice a great deal of relevant algorithmic changes, but have difficulty bracketing them as algorithmic change in particular, a point we will return to in section 5.2. With change noticed, the process plays out largely as described by DeVito et al. (DeVito, Birnholtz, et al., 2018) with the important addition of a continuous interplay between adaptive sensemaking and information foraging. As opposed to the one-way relationship asserted previously, where foraging informed sensemaking, we have updated our model (see Figure 9, relevant updates in green) to account for the kind of cross-checking and comparative verification that we see throughout our data, but especially among structural theorizers. Now, foraging and sensemaking are a crucial mini-loop in the process, with foraging informing adaptive sensemaking, and the midlevel products of sensemaking (which we might think of as ***preliminary folk theories***) driving further sensemaking during the verification process. Notably, this cognitive loop is likely a good thing which we should encourage via design, as repeated discussion or consideration of folk information helps expand our related theorization ability (Ratner & Olver, 1998; Rottman & Keil, 2012).
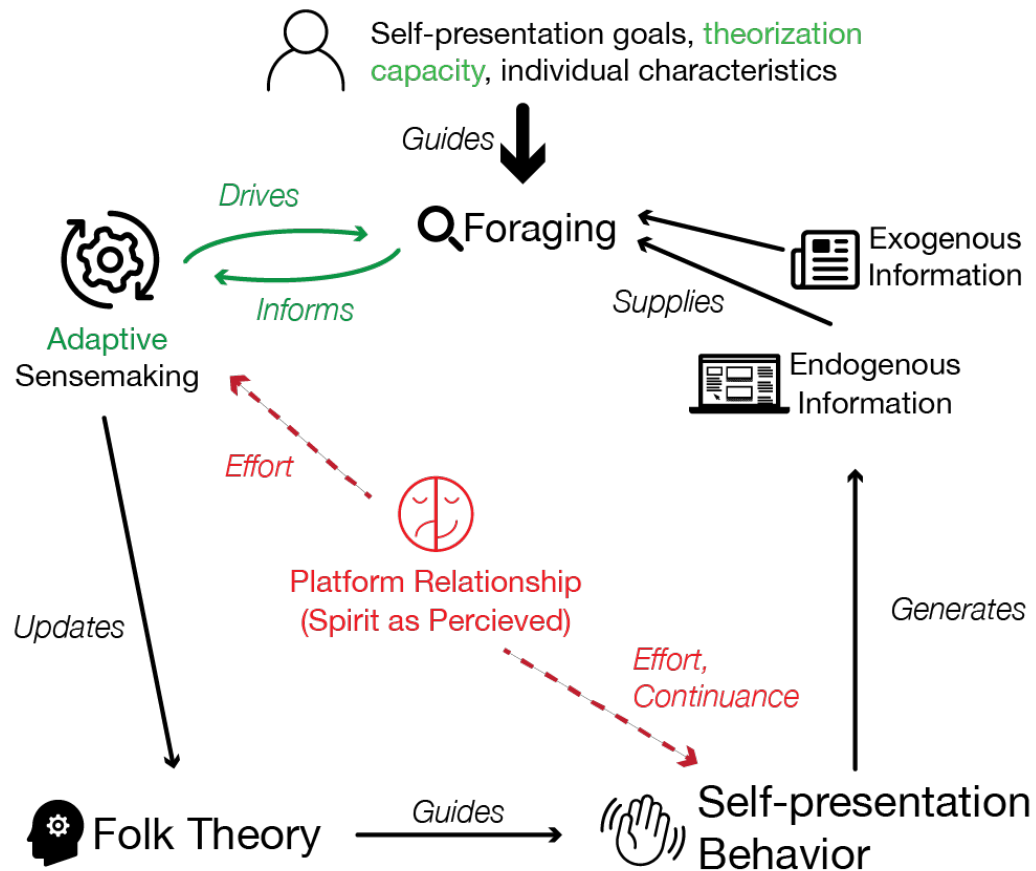
Figure 9: Updated folk theory formation process for self-presentation via social platforms, highlighting the adaptation process itself in green and the impact of perceived platform spirit and one's relationship with the platform in red.

Second, as theorized by DeVito et al., the process of folk theory formation is always embedded within and responsive to a larger operating context and technical environment (DeVito, Birnholtz, et al., 2018) – here, the process of self-presentation. While that work accounted for the influence of classic self-presentation factors such as self-presentation goals and styles (Arkin, 1981), as well as classic self-presentation-related individual characteristics such as web skills, self-monitoring ability, and personality factors (DeVito, Birnholtz, et al., 2017; DeVito, Birnholtz, et al., 2018), it does not account for one's capability to undertake the process under study: folk theorization itself. Our results show that folk

theorization capacity has impacts throughout the process of folk theorization in service of self-presentation, from the types of information one is likely to base their theorization on, to the breadth of options one has in determining how to respond to platform change. Consider the lived differences in our examples from section 4.3. P15, a functional theorizer, has limited capacity to forage for information and little capacity to adapt, leaving response options which consist of slightly adjusting their existing self-presentation tactics or simply bailing from a platform they say is essential for connection. Meanwhile, P17, a northstar theorist, mostly idles – they are unhappy with the situation on many of their platforms, but have a small, static foraging process and ultimately are not able to take much action at all. By contrast, P31, a structural theorizer, has robust foraging pathways and a range of response options that let them limit, leave, or adapt in a way that closely supports their own self-presentation style, even on platforms like Tumblr that they experience as chaotic and confusing. Clearly, the structural theorizers have the advantage in this process, making this an important factor to account for in future self-presentation and folk theories work.

Additionally, this points us to another important area for future investigation: the plight of northstar theorists, who struggle overall. Considering the lack of options regarding adaptation that northstars face, and the feeling of inefficacy or helplessness many of them report, it is possible that they are prone to the dig-in effect which can occur during sensemaking in rapidly-changing conditions when self-conscious emotions impact the process (Maitlis & Sonenshein, 2010), and which we saw to a minor extent while assessing malleability in (DeVito, Birnholtz, et al., 2018). This is further supported by the structure of their folk theories, which suggest that they understand the core mechanic of multiple factors

impacting system decision making, but are unwilling or unable to use this structure to contemplate theories beyond the one dictated by the first fragment they discovered to be important. Further work directly with this group could help better explain them while also identifying ways to help move past the dig-in effect.

Third, based on participant responses we can confirm that, in this personal, social platform context, our expanded and updated definition of ***platform spirit***, which includes elements of what is often referred to as task-technology fit, is appropriate. Consider P21's vitriol at having their core use case for the platform threatened – they were not simply upset about an inconvenience related to a task. Instead, they were angry, and somewhat offended, using language that suggested the platform had stepped over its bounds in a personally infuriating way. Clearly, task fit is seen as having an equivalent, if not identical, emotional valence as traditional spirit issues in this context. This expanded concept let us look at the impacts of how much a platform is perceived as honoring or violating this user-perceived spirit on the folk theorization and self-presentation processes, revealing the importance of accounting for perceived platform spirit when studying these topics, as it can impact how much effort a user is willing to put into adaptation and sensemaking, and when violated can negatively impact basic decisions about continuance (see Figure 9, relevant updates in red).

Importantly, our results show us that, during the adaptation process, users are not simply thinking about mechanism, nor are they simply evaluating whether a discrete change honors or violates platform spirit. Rather, our participants often took both the immediate change's impact on spirit and the platform's recent history regarding honoring or violating spirit into account. This suggests that there is a longer-term issue at play here, which may

potentially constitute trust (or distrust) in a platform to honor spirit. This can, in turn, color how users interpret individual changes. We know that user perceptions of past system performance impact user trust in an algorithmically-driven system more broadly (Dietvorst, Simmons, & Massey, 2015; Yu et al., 2017), as does the user's sense of if a system intends to help them accomplish their goals (J. D. Lee & See, 2004; Yu et al., 2017), and a version of this appears to be playing out while evaluating spirit.

While we have only used it as an example sparingly in order to illustrate the diversity of user concerns, many in our pool of queer participants brought up the Tumblr adult content ban as an example of spirit violation at some point, in conjunction with changes that were not always directly related to this change. For many of these participants, Tumblr was a crucially important platform for identity reasons – unsurprising for a platform that has been written about in academic terms as a specifically queer platform which provided a unique and crucial space for exploring the importance of the erotic in the queer community (Haimson, Dame-Griff, Capello, & Richter, 2019). Removing adult content via algorithmic content moderation was a clear violation of platform spirit, both in the traditional platform values sense as well as in the now-emotionally-valanced use case sense, and this went on to color later evaluations of the platform in many cases. What impacts folk theorization is not just if a change honors or violates platform spirit, but rather this judgement as heavily informed by the context of a larger history of honor or violation. In fact, we can see confirmatory echoes of this phenomena in related work on professional and influencer populations. Both Cotter (Cotter, 2018) and Wu et al. (Wu et al., 2019) discuss situations where the systems in question (Instagram and YouTube, respectively) create a sense that

they are not on the user in question's side, resulting in the kind of gaming behavior that we see in unfaithful adaptation.

Considering the impact of spirit violations we can see from this study, perceived platform spirit represents another crucial area of future inquiry, as it is very possible we have not yet uncovered the extent of the impacts of these violations on folk theorization or user self-presentation behavior. Consider that negative emotions can hinder the sensemaking process, resulting in less information processing, increased criticality of the system as a whole, and premature solidification of a theory and subsequent dig-in (Maitlis & Sonenshein, 2010). Also consider that one's adaptation process is also impacted by how threatening a change is and how much of a sense of agency one has. In a high threat situation, which one could see spirit violations as, a sense of agency will lead to negative emotions and angry venting, while a lack of agency will lead to deterrence emotions and reduced use. In a low-threat situation (e.g., changes where the platform is being faithful to its spirit), agency will prompt positive emotions and creativity, while a lack of agency at least leaves the user with positive feelings towards the platform (Beaudry & Pinsonneault, 2005). In the context of northstar theorists alone, we can see how a spirit violation situation could be particularly unproductive, as they are a group that both lacks agency and is already prone to dig-in.

5.1   Implications for Algorithmic Literacy

Using folk theorization as a lens, this project was designed to define and provide points of intervention for algorithmic literacy. As we will note shortly, we do have a new direction for this literacy. However, as we have very directly pegged our goals to the standard of "effective use," it is important to recognize that algorithmic literacy alone is not enough to

ensure this in a broader sense. What is needed here is a New Literacy, or a literacy that concerns "the skills, strategies, and dispositions necessary to successfully use and adapt to the rapidly changing information and communication technologies and contexts that continuously emerge in our world and influence all areas of our personal and professional lives" (Leu et al., 2004, p. 1572). New Literacies, even more so than other literacies, are about extensibility, as they are built to recognize that technology will change rapidly and shift in context between cultures, and aim to train people to critically evaluate and respond to situations in the field, key concerns we have laid out as motivation for this work.

New Literacies are also multiple literacies which specifically recognize that, in the context of complex modern technologies, literacies must build on each other and interrelate, and cannot stand alone (Leu et al., 2004). Consider the importance of basic information literacy, computational literacy, and media literacy to algorithmic literacy specifically. The information-seeking skills, and ability to know when to seek more information, promoted by information literacy (Behrens, 1994) can help with information foraging and noticing change, while the structural knowledge of computational procedure from computational literacy (Yadav, Good, Voogt, & Fisser, 2017) can potentially help users think of the kinds of more advanced structures we see with structural theorizing. Ultimately, all users will still need to be able to critically evaluate content on the platform (Jenkins et al., 2009), and media literacy could even help one evaluate the veracity of information during exogenous information foraging. Algorithmic literacy should not stand alone, and in fact is best seen as a component of a larger ***platform literacy*** which encompasses all of the aforementioned

literacies, with algorithmic literacy taking its place as a component literacy focused on the specific platform content and its related pace of change.

As to algorithmic literacy itself, recall our definition from earlier:

the capacity and opportunity to be aware of both the presence and impact of algorithmically-driven systems on self- or collaboratively-identified goals, and the capacity and opportunity to crystalize this understanding into a strategic use of these systems to accomplish said goals

To truly act strategically in a constantly changing environment, users must strategically adapt. To do this, users must be responsive to the causes of the effects of algorithmic platform mechanisms, not simply the effects themselves. In terms of folk theorization, they need to be structural theorizers, working at a mechanistic, or structural, level, adapting their behavior directly to the algorithmic system itself. Looking at the structural theorizer adaptation pathway for self-presentation, we can see that the ability to work at this level enables this kind of strategic adaptation to pursue one's goals, while the functional and northstar theorists are left to simply react to effects. Moreover, the ability to theorize at a structural level gives the user far more freedom to experiment and expand their own knowledge, and even resist through unfaithful adaptation in some cases. Structural theorization ability, essentially, gives the user agency. In turn, a sense of agency prompts more useful learning and creative adaptation – as opposed to the stagnation those with less agency may find (Beaudry & Pinsonneault, 2005).

Ultimately, from a folk theorization perspective, the goal in terms of reaching algorithmic literacy is to boost users to structural theorization. There is significant reason to think this is possible, however, as functional and structural theorization respectively deal with functional and structural knowledge, and the former can help build the latter. While

functional knowledge, e.g. knowledge that reaches the level of causal powers, can't tell us how a system works, it does serve to inform us where complexity likely exists and merits further explanation (Keil, 2012a). Humans regularly infer the degree of internal complexity of a system by examining the external functionality (Ahl & Keil, 2016). Functional knowledge, especially causal powers-level theorizing, can be turned to structural knowledge/mechanistic theorizing, which in turn enables the strategic, effective use we would call algorithmic literacy. As diSessa puts it (DiSessa, 2001) p144:

> *Function provides a way in. Structure follows and makes the device comprehensible in its own, probably initially unfamiliar terms, but understanding structure also makes the device flexible far beyond the way into using it.*

To be clear, by "understanding structure" in this context, we do not mean full mechanistic knowledge, or even the highest-level mechanistic ordering-style theories. We saw few significant differences within structural theorization in our results, and none that would indicate mechanistic ordering is necessary for algorithmic literacy. Rather, the threshold appears to be knowledge that multiple mechanistic fragments are part of the algorithmic decision-making process in question. In fact, it may not matter if knowledge of specific fragments is retained for long. Having mechanistic knowledge, even temporarily, creates memory and structure of complexity (Ahl & Keil, 2016; Keil, 2012b). This is part of an "essentialist bias" in which the brain essentially "reserves space" around an intuitive theory in preparation for the details to be filled in; this space, filled or not, lends the intuitive theory the weight of actual understanding. (Rozenblit & Keil, 2002). To put this in more HCI-native terms: sparse data looks bigger than it actually is. Keil echoes this point when he talks about "framework theories," structures waiting for detail to be filled in, in his 2003 review;

in later work, (Keil, 2010) fleshes this notion out further, noting that in most domains the skeletal structure remains sparse, preventing internal contradictions, only becoming fleshed out in relevant areas and fully articulated when prompted to form the basis of an explanation. In terms of practical on-platform adaptation, this suggests that even if specific knowledge of specific fragments is not retained, the knowledge that there are many fragments is enough to tell the user how to adapt: ramp up information gathering to find out what has changed in terms of the influence of various mechanistic fragments.

5.1.1   Future Work: How to Boost Theorization

Future work in this area should explore possible mechanisms for introducing this more structural information to functional theorizers. To begin with, the fact that there is no need for retention of specific structural information suggests that informal approaches in line with the larger multiliteracies approach would be appropriate and effective here (Knobel & Lankshear, 2014; Leu et al., 2004). In terms of more formal approaches, we propose two avenues of future exploration.

One approach, largely borrowed from the cognitive development literature, is to carefully scaffold causal understanding via interrogating mechanistic detail. For true conceptual change to occur, a discrete process of what is essentially knowledge-based infrastructure building is necessary in order to create the spaces which will be filled in by new knowledge (Wiser & Smith, 2016). In order to build this mechanistic scaffold, we must open the individual up to questioning their current theory. In terms of an actual mechanism for instantiating these exploratory periods, especially in children, pushing on explanations and asking users to explain themselves further can reveal the need to learn more specifics to

the individual, prompting question-asking behavior (Mills & Keil, 2004). Once this is achieved, however, there is only a brief window in which to educate between overconfidence borne of ignorance and overconfidence borne of ever-so-slightly-less ignorance; once many people encounter an "expert explanation," they immediately start to rate themselves as experts on the topic (Rozenblit & Keil, 2002). We must therefore choose our interventions carefully.

Another potential approach is to provide useful experts. Humans are largely wired to defer to relevant experts when needed; children are particularly good at this (Keil, 2010). Especially if we can impress causal complexity onto users as discussed above, allowing them to better know when to turn to an expert, the recruitment or creation of an expert source could be valuable. This expert source, regardless of form, would need to meet basic criteria for acceptance of experts: a good track record, a lack of conflicts of interest, a clear and consistent offered explanation, and a position not too far off the generally-perceived consensus (Keil, 2012b).

One key consideration when considering the disposition of an expert is how their explanations are framed. Different modes of social interaction can change how individuals think about and approach an issue, and how accepting they will be of explanations In a series of experiments making individuals argue either cooperatively ("arguing to learn" in which arguments are weighed against each other to find an accurate position) or competitively ("arguing to win" in which one position must trump all others), Fisher et al. found that there was a specific, positive effect on the acceptance of new information in folk understandings when arguing cooperatively. Competitive argumentation, meanwhile, often backfires

(Fisher, Knobe, Strickland, & Keil, 2017). As such, any expert cannot simply say "your theories are wrong" – it must be a cooperative process.

Fisher et al. also argue that competitive argumentation mindsets are more likely to happen with strangers (Fisher et al., 2017). As such, familiar faces can only help build understanding. Obviously, parents and teachers are key figures here, but there is also the opportunity for platforms that wish to better inform their users to create their own friendly characters. Consider Facebook's "Privacy Dinosaur," a friendly character who leads users through privacy setup and the introduction of new privacy-related features; one can imagine a counterpart dedicated to explaining how a platform's algorithms affect the user, specifically built to be conducive to the formation of parasocial relationships. A friendly face (the "algorithm aardvark," perhaps?) could help here.

5.2   Challenges for Platforms

This study presents four direct challenges to social platforms themselves, which we hope platforms will be mindful of and attempt to directly address in future design work. First, as noted in the results, the crucial noticing step that kicks off adaptation is hampered by repeated conflation of change type, such that feature changes appear to crowd out opportunities to notice algorithmic change. This is essentially a problem with bracketing, the step in sensemaking which involves bounding the location and extent of the change phenomena in order to begin assessing and adapting to the correct change in the correct manner (Weick et al., 2005). To address this noticing challenge, one approach is to use the problem to the platform's advantage, pairing more subtle algorithmic changes with very

visual interface or aesthetic changes as a signaling mechanism. On a larger scale, approaches such as seamful design could be considered (Eslami et al., 2016; Rader & Slaker, 2017).

Second, this study highlights the importance of platforms understanding not just simple user satisfaction, but the full relationship and related expectations encapsulated in platform spirit and the platform's history of honoring or violating that spirit. To borrow terms from Gillespie's definitions of "algorithm," platforms must account for the user's conception of them as both synecdoche (the entire technical system and related inputs, outputs, and value system) and talisman (an agential actor representing the platform and its ownership) (Gillespie, 2016). Based on our findings, prior work in this context (e.g., (DeVito, Gergle, et al., 2017)), and work on user understanding more generally (e.g., (Gelman & Legare, 2011; Herman, 2013)), it is clear that users are holding the platform accountable to their own perceptions of spirit as they would hold any agential actor accountable. As such, they want to understand not just the "what" technically, but the "why" behind platform actions, likely viewing (and judging) the platform as a fellow social actor (M. K. Lee, 2018; Schmitz et al., 2016). Platforms that ignore spirit and especially those that repeatedly violate what their users perceive as their spirit risk the detrimental trust- and sensemaking-related problems discussed at the top of section 5, as well as use-related consequences. Our results demonstrate that spirit-based judgments of platforms are a major basis upon which people decide if they will adapt. They also demonstrate that limiting one's participation to the point of being a user who is far less useful to the platform or simply leaving are definitely alternatives on the table.

The third challenge is also a charge: never forget that adaptation to change on social platforms is labor, and act accordingly when designing, deploying, and explaining new versions of systems. Platforms would be well advised to not take adaptation as a given. Rather, platforms are advised to treat ability (or willingness) to adapt as a finite resource. At a base level, considering that nearly all participants repeatedly took issue with the pace of change, this includes being very attentive to and internally critical about what truly needs to change about a platform. To go further, platforms can consider ways to address the barriers to getting the information needed to make adaptation decisions discussed in section 4.4.4, which broadly concern a lack of specificity for all, a lack of simplicity for functional theorizers, and an organizational challenge for structural theorizers. To tackle specificity while being mindful that they are asking for labor, platforms are advised to make the value proposition of adapting very clear to the user, as adaptation to technology more generally has been shown to be positively affected by making the personal relevance and specific utility of a change clear (Davis, 1989; DiSessa, 2001; Gelderblom & Menge, 2018; Orlikowski & Hofman, 1997; Vaniea, Rader, & Wash, 2014; Venkatesh et al., 2003). To tackle the clarity problems faced by functional theorizers, platforms can attend to how they explain, with repetition and elaboration (Rottman & Keil, 2011) and the use of storytelling techniques and user-congruent framing (E. Davidson, 2006; Herman, 2013; Rader, Wash, & Brooks, 2012) as possible mechanisms and the emerging body of work on algorithmic explanation as a guide (for a full treatment, see (Rader et al., 2018)). To tackle the organizational problems faced by structural theorizers, we forward the concept of a change clearinghouse from

several of our participants, a central location for notification and library-style reference on social platform change – essentially, a platform-built exogenous foraging aid.

Of course, improved knowledge of the platform in the first place would aid adaptation overall, from initial noticing to adaptive sensemaking (Keil, 2010; Simons & Levin, 1998; Simons & Rensink, 2005; Webber & Johnston, 2000), which is why our final challenge is to find ways to support algorithmic literacy both on and off platform. To be clear, we put this responsibility squarely on platforms, not individual users or even educators. It is instructive here to look to the case of media literacy, where a focus on personal responsibility left the task of assessing and boosting of literacy largely with individuals, parents, and schools, resulting in overestimation of skills and limited progress in the overall effort to build media literacy (Bulger & Davison, 2018). Simply put, this cannot be left to the individual, or done on a casual catch-as-catch-can basis. Both approaches to past literacies have resulted in a lack of progress as well as specific deficits and growing inequality for low-resourced individuals (Behrens, 1994; Bulger & Davison, 2018; Jenkins et al., 2009; G. M. Johnson, 2007; Webber & Johnston, 2000), the very same groups that are now showing an emerging gap around algorithmic knowledge (Cotter & Reisdorf, 2020). Consider the outsized influence platforms have over work, information flow, politics, and sociality (Gillespie, 2014, 2018a; M. K. Lee, Kusbit, Metsky, & Dabbish, 2015; F. Pasquale, 2015; F. A. Pasquale, 2011), juxtaposed against the continuing importance of endogenous information as a folk theorization source for functional theorizers especially, the need for non-classroom, informal intervention with any New Literacy (Leu et al., 2004), and the sheer amount of

resources most platform companies currently hold. Clearly, platforms are in an ideal place structurally and financially to take the lead on algorithmic literacy.

5.3 Limitations, Transferability, and Future Work

This study must be read within the context of the project's limitations. Additionally, as an exploratory study, it only partially answers some important, emerging questions. In addition to the limitations regarding transferability discussed in section 5.3.1, there are four notable areas for caution in interpretation and future work.

First, while we are confident in the TCLs we have discussed above, our findings concerning northstar theorists are based on a smaller group than our findings on functional or structural theorists. Additionally, there were multiple differences in behavior among northstar theorists that may indicate that while northstars face similar challenges to each other, they may have disparate causes. As such, more work specifically on northstar theorists will be required to better understand this group, its internal diversity, and the particular challenges they face regarding folk theorization and algorithmic literacy.

Second, though section 3.2.1 spells out our rationale for using Facebook as an organizing platform, and our findings provide an important picture of how theorization and literacy work in the current platform environment, they are still ultimately limited by the bounds of that environment. Future work should explore how theorization does and can happen in algorithmic spaces beyond dominant platforms. Considering the continued and sometimes-heightened importance of exogenous information to the theorization process, and the impact of perceived platform spirit on adaptation, it would be particularly interesting to explore

how these processes work in spaces where the community itself helps set algorithmic standards, e.g., peer production and open source environments.

Third, while our findings around the impact of perceived platform spirit on adaptation provide a way to begin accounting for affective and trust-based aspects of the human/platform relationship, future work is needed to better understand what informs perceived spirit. Considering how often participants discussed not being able to leave platforms, and how important individual use case is to perceived platform spirit, future work is needed which more thoroughly explores theorization, adaptation, and literacy in the context of one's overall personal social media ecosystem and use history.

Fourth, while this study engaged participants deeply on one area of their technology use, it did not fully account for the individual's overall baseline relationship to technology. Considering the enjoyment expressed by some participants over their adaptations, juxtaposed against the sheer annoyance felt by others at the thought of even having to adapt, it is possible that high-level relationship to technology plays a yet-unspecified part in adaptation. Future work which more thoroughly explores use history beyond social platforms, voluntary exploratory behavior around technology, and propensity to test or tinker with systems could help us further refine our understanding.

5.3.1   Transferability Beyond Queer Populations

As noted in section 3.3.6, it is important to examine one's qualitative findings in the context of the situation and population they stem from in order to assess transferability (Guba & Lincoln, 1982). Upon examination, we remain confident that these results are broadly transferrable, with a few important caveats. We checked each of our findings against

both overall outness (J. Mohr & Fassinger, 2000) and each experience-based subscale of the LBIS (J. J. Mohr & Kendra, 2011), and found no patterns on either of these queer identity-related factors, suggesting that variance in queer identity does not explain what we have found here. However, we also failed to sample those who are extremely closeted – as such, it is possible that we have not adequately explored those who are not open about their identities in general or who have extremely salient reasons not to disclose their identities. This is an important area for future work.

It is also important to note that the majority of participants used the Tumblr adult content ban as an example at some point. While this is unsurprising due to the sheer importance of Tumblr to queer populations (Haimson et al., 2019) and the outsized negative impact of this particular change on queer identity development, it does suggest that the queer population as a whole may have more reason to be aware of algorithmic influences on platforms. However, precipitating events are not unique to the queer community, as we saw in #RIPTwitter (DeVito, Gergle, et al., 2017). While this does not directly threaten the transferability of our results, it likely resulted in a sample that is overall more aware of algorithmic actors than a general population sample. It is likely that far more users than indicated here are either at pre-awareness or a functional TCL, highlighting both the importance of future work on interventions to boost theorization capacity and the need for continued work on fostering initial algorithmic awareness.

Finally, while our LGBTQ+ participants often recounted the impact of individual risks when discussing their self-presentation decision making, this was most often the specific risk of identity disclosure, which is heightened for those with stigmatized identities (Goffman,

1963). While there is no reason to believe that individual risk would not be a motivating factor in how we approach and execute adaptation via folk theorization outside an LGBTQ+ context, it is likely that the risks the individual focuses on, and the extent of the risks on the whole process, will vary by context. This highlights the importance of future work which specifically explores the impacts of perceived risk on theorization and adaptation, and does so in a broader, more general context.

5.3.2 Future Work: Folk Theory Methods Toolkit

Finally, by asserting folk theorization as a path towards algorithmic literacy, this study also asserts the need for a portable toolkit for folk theory work. A full ARC-style deployment as used here may not always be practical or appropriate; as such, future work should aim to refine and simplify these methods for folk theory and theorization elicitation. As a preliminary step towards this toolkit, we offer a reflection on the most crucial elements of the present work.

By far, the most important activity in this study was week 3's visual elicitation exercise. While the artifact itself often provides a wealth of information about how a participant theorizes and adapts, it is even more useful as a way of generating follow-up questions which dig deeper into these key issues. The week 7 letter to the CEO activity (with structured worksheet) was also essential, as it both reveals perceived platform spirit and provides a window into what participants see as challenges to adaptation. Finally, the week five change scavenger hunt provides a direct avenue for gauging participant awareness and stimulating discussion of specific changes and adaptations. These three activities combined are, based on performance in this study, likely to elicit enough information to determine

the basics of TCL, perceived platform spirit, and awareness of platform change. Additionally, following the advice of section 5.1, we suggest incorporating a personal social media ecosystem mapping activity similar to the central activity in (DeVito, Walker, et al., 2018) in order to get a better picture of how relevant processes play out across a participant's whole ecosystem.

Importantly, this preliminary toolkit, and future work towards a more robust toolkit, also have the potential to work as an education tool outside of research contexts. As discussed in section 5.1.1, one way to scaffold in critical structural information in pursuit of literacy is to prompt the learner to question their current understanding (Mills & Keil, 2004; Wiser & Smith, 2016). With a more explicit upfront framing, this group of 3 (or 4) activities could be used to open learners up to questioning their own understanding. For example, in a research context, the visual elicitation exercise is interrogated at the very end of the research period, to avoid biasing the participant's future answers. In an education context, a teacher or tutor could question the visuals as they are produced, encouraging students to think through the "why" behind the image they are creating.

6 Conclusion

This dissertation has expanded our knowledge of the folk theorization and adaptation process in the context of self-presentation on social platforms. In doing so, it has provided guidance for an algorithmic literacy which accounts for the constantly-changing platform landscape. By studying not just user folk theories, but rather their entire process of folk theorization, we were able to identify future points of intervention for this literacy, as well as potential paths forward. We found much to be hopeful about regarding the potential of folk theories as a literacy tool, and will in the future pursue work which capitalizes on this potential. Our hope is that by starting in the user's own perceptions and lived experiences, at the level of the user's own folk theorization, we can promote the virtuous relationship between functional and structural knowledge which can build literacy, much in the way diSessa suggests:

> *In the best of worlds, structure and function are friends with different personalities to be called on differently. Function is your first friend, up front and direct. Structure stands back and supports. Later, function stays home and keeps the household, while structure opens doors and builds bridges to exotic lands, but only if you understand and work with it. (DiSessa, 2001, p. 163)*

Awareness and functional folk theorization are the user's first friends, helping us get our initial bearings. Structural folk theorization, by contrast, opens those doors and builds the ability to thoroughly explore and mechanistically reason about the platform. We need to help users theorize, to "work with" the structure of platforms to pursue their goals, even in the face of the unexpected.

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Appendix A: Weekly Activity Prompts

6.1 Week 1

6.1.1 Community Prompt (Facebook)

Hi All, and welcome to the study! It's time for the week 1 activity. This week, we want you to tell us a little bit about yourself and why you post to social media. Feel free to include anything you think is relevant, but we've got a few key areas to start with that will help us get to know you: what you post about and why, your history with posting, any cool strategies you have, and how you engage with other people's posts. Ultimately, this week, we just want to know a little more about what you, and your online activity, are all about. There's also a few multiple choice items here that will help us understand where we're all starting from.

Remember, each week should take you roughly 20 minutes, you should answer in the form linked here, you can always ask questions here or by DMing study staff, and you should react to this post when you're done to show the community you've participated for the week.

Looking forward to hearing your stories!

6.1.2 Full Prompt (Qualtrics)

Welcome to week one! This week is all about you.

This week, we want you to tell us a little bit about yourself and why you post to social media. Feel free to include anything you think is relevant; we've got a few key areas to start

with that will help us get to know you. Ultimately, we just want to know a little more about what you, and your online activity, are all about.

We've broken this down into a few questions we'd like you to answer here, and then we'll be following up with some standard measures that will help us understand how you use social media and how well this group represents the diversity of the LGBTQ+ community. Feel free to think over the questions on this first page for a while and come back when you feel ready to answer them. Detail is key - we want to hear your stories to their fullest, as often the details wind up being very important.

As always, feel free to ask any of the study team any questions you may have, and feel free to post clarification questions to this week's thread in the Facebook group. Once you're done, please react to the post so we can see that you've shared your thoughts.

- What do you post about, and why? You can talk about what you think is important to post, how it makes you feel to post, what your goals are, etc. – whatever you think is important.

- What's your history with posting? Have things changed over time? Stayed the same? We want to know all about it!

- Do you have any strategies you may have come up with or tricks you know about for getting your posts out there to more people – or just certain people?

- When you engage with other people's posts, what do you usually do? Are there any particular ways you handle or react to different kinds of posts? Any ways you think are important to interact with other people's posts?

6.1.3   Additional Items (Qualtrics)

- Platforms you use

- Primary platform

- Usage scale

- Platform centrality

- Outness

- Lbis

- Self-monitoring

- Web skills short form

6.2   Week 2

6.2.1   Community Prompt (Facebook)

Welcome to week two! This week is the lightning round. We're looking for quick takes on the most important social media platforms in your life, based in your own experiences with making decisions around expressing your identity online. We've got three quick activities, and for each, give us responses based on your own experiences:

Remember to put your participant ID in at the top of the form - that's the only way we know it's you.

As always, you can post any questions you might have about the activities right here, or reach out to study staff with any questions or concerns.

Looking forward to seeing your responses!

6.2.2   Full Prompt (Qualtrics)

Welcome to week two

This week is the lightning round. We're looking for quick takes on the most important social media platforms in your life, based in your own experiences with making decisions around expressing your identity online. We've got three quick activities, and for each, give us responses based on your own experiences. Remember, we're not necessarily talking about the kind of content you see on the platform here – we're talking about the platform itself, and especially how the platform distributes your content once you post it.

Would You Rather?

The first activity this week is a "would you rather" (and why!). Let us know which of the following things you'd rather do:

Post what you want to post and hope for the best

Do a lot of research into figuring out how you "should" post

Now tell us a little bit about why you'd rather do the thing you chose. Remember, specifics are important - we'd appreciate hearing a bit about the reasons behind your decision, and any specific incidents that may have helped you make your decision.

What's Most Important?

For the second activity this week, we'd like you to pick one thing from the list below that's most important to you in terms of your own decision making around posting to a social media platform:

- Ease of use (you don't have to put much effort into figuring it out)

- Maximum options (you can do pretty much anything)

- Consistency (it always works the same)

- Innovation (it's always changing and trying new things)

- Something else (if none of these are the most important to you, tell us what we missed when you explain below)

Now tell us why this is the most important thing to you in terms of making decisions around posting to a social media platform:

Tag Your Platforms

This week's last activity is to put together your version of a classic "tag" meme, the kind where you choose which of your friends best fit different categories. This time, we want you to do it with the social media platforms you post to most regularly. Think about your experiences posting to the six platforms you post to most frequently, especially in terms of how you view the platforms when making decisions around posting, and assign each of the six categories we provide below to one of the platforms - then tell us why.

As an example, we've put up our tag meme for streaming video services, which you can see right below. You don't have to do it exactly this way, but this will show you how the meme works generally.

- iTunes/Apple Music: The Chaotic One (because it recommends things that are very different from each other, sometimes latches on to one thing and promotes it, is always changing how it does recommendations, and seems inconsistent)

- Netflix: Your Best Friend (because it pays attention what you've watched, separates what's popular from what would be good for you, knows you like to watch certain things again and again, and tries to bring you things you'd like)

- Amazon Prime Video: The Operator (because it mostly pushes new releases and original content that Amazon wants you to watch, and recommends generally popular things

- HBO Go/Now: The Oversharer (because it constantly tells you about new genres and channels it's adding and pops up a ton of notifications)

- Spotify: The Reliable One (because it always recommends based on your playlists or artists you frequently listen to, and brings you new music that makes sense to you)

- Hulu: The Mysterious One (because it's not clear how recommendations work, and there's not a lot of them)

Your turn! Remember, we're asking about the social media platforms you post to most often, and how you think about them when you go to post. Take a moment to think about which of the social media platforms you use fit each of these categories the best:

- The Reliable One – always consistent

- The Chaotic One – always trying something new, but is unpredictable

- Your Best Friend – always there for you

- The Oversharer – impossible to not know what's going on with them

- The Mysterious One – impossible to know what's going on with them

- The Operator – always there for their own agend

We're going to go category by category - let us know which platform you're tagging for each category, and then tell us a little bit about why. You can give us your relevant feelings

regarding the platform as a start, but try to provide specific examples of times when posting to (or trying to post to) the platform made you think about the platform in this way.

[What platform and why open responses per each]

6.3   Week 3

6.3.1   Community Prompt (Facebook)

This week it's time for some arts and crafts. **Make an image that represents how you think the platform you post to the most gets your posts from you to the people that see them.** This can include any details or processes you think are relevant. You can think of this as a map, a sketch, a diagram - whatever format helps you show us what you think is going on behind the scenes on your platform of choice.

Use whatever visual representations make sense to you. Use drawings, colors, symbols, words, boxes and lines, clipart, stick figures – whatever you need to reflect how you think this works. **There's no wrong way to express yourself here** - this is about you telling us what you think is going on, not about art quality or "getting it right."

When you're done, export a copy (if you worked digitally) or scan your work/snap a (clear) photo of it (if you worked on paper) for your weekly submission, and either email it to [email] or DM it to a study staff member. **Remember to let us know what platform you're talking about!**

As always, if there are any questions, ask them here or DM one of us!

6.4 Week 4

6.4.1 Community Prompt (Facebook)

Hi all, welcome to week four. This week, we've got some scenarios we'd like you to put yourself in, and we want you to tell us how you'd react to a few problems you might face. For each scenario, assume you're trying to post your usual type of content to a social media platform, and tell us how you would react, and if/how you might change how you post to and interact on social media in the future. That can include your content, the settings or options you choose around it, or even just how you think about the platform.

As always, if you have questions, feel free to ask any of the team or just post them here.

6.4.2 Full Prompt (Qualtrics)

This week, we want you to tell us how you'd react to a few different scenarios on social media platforms. For each of these, assume you're trying to post your usual type of content to a social media platform, and tell us how you would react, how you might figure out what happened/what went wrong, and if/how you might change how you post to and interact on social media in the future. That can include your content, the settings or options you choose around it, or even just how you think about the platform.

You wake up one morning, and you're seeing a ton of posts all over your favorite platform about how the platform is making big changes to how content (posts, images, videos, etc.) is going to be delivered to people.

What do you do? Do you react? If so, how? Does anything change the next time you go to post – and if so, how do you make that decision? Any information in particular that would make it easier for you to know how to react?

Again, assume you're trying to post your usual type of content to a social media platform, and tell us how you would react, how you might figure out what happened/what went wrong, and if/how you might change how you post to and interact on social media in the future. That can include your content, the settings or options you choose around it, or even just how you think about the platform.

You go to post to your favorite social media platform, and you notice that the interface for posting looks different. There are a few new options in terms of who your post could be visible to as well as other privacy settings you can apply to your posts, and you're pretty sure some old options are either missing or have moved.

What do you do next, both in terms of understanding what's changed and deciding how to post going forward?

Feel free to base your answer on what you've done before if you've actually had this happen, or just think through this scenario and tell us what you think you'd do next.

Again, assume you're trying to post your usual type of content to a social media platform, and tell us how you would react, how you might figure out what happened/what went wrong, and if/how you might change how you post to and interact on social media in the future. That can include your content, the settings or options you choose around it, or even just how you think about the platform.

After a few hours off of social media, you log back on and, based on an angry message in your inbox, realize that your last post has been seen by someone that you did not intend to see it, despite the fact that you're pretty sure you set the privacy/visibility options in a way you thought would exclude them.

Aside from a careful reply to the message in your inbox, what do you do? Is there anything in particular that you do in the moment? What about when setting up future posts?

6.4.3   Additional Items (Qualtrics)

Need for cognition scale

6.5   Week 5

6.5.1   Community Prompt (Facebook)

Welcome to week 5! We're more than halfway done, and it's time for a scavenger hunt (of sorts)!

This week, we want you to take some time to think about how the social media platforms you post to have changed over the last few years. Try to remember or "spot" the differences that have cropped up in that time. You can think of it like the "spot the difference" games from kids magazines – can you spot the differences between versions of social media platforms?

When you're thinking about change, think big *and* think small – has the interface changed? New, updated, or removed features or options? Changes you've noticed or heard

of in regards to how the platform is working behind the scenes? In the way your posts seem to get distributed, or what posts seem to be coming your way? Whatever changes you noticed, we're interested in them.

You can keep the writing pretty brief this week - a list is perfect! There's some more details on how to format that in the submission form.

6.5.2   Full Prompt (Qualtrics)

Take some time to think about how the social media platforms you post to have changed in the last few years. Try to remember or "spot" the differences that have cropped up in that time. You can think of it like the "spot the difference" games from kids magazines – can you spot the differences between versions of social media platforms?

When you're thinking about change, think big and think small – has the interface changed? New, updated, or removed features or options? Changes you've noticed or heard of in regards to how the platform is working behind the scenes? In the way your posts seem to get distributed, or what posts seem to be coming your way? Whatever changes you noticed, we're interested in them.

You can keep the writing light this week – a simple list of the changes you've noticed is perfect. **Try to tell us when you noticed the change, and, if you can remember, what made you notice the change.** For example, you could put one change per line in the text box below, in something like this format: *platform, change I noticed, when I noticed it, how/why I noticed it, what I did about it.*

Try to tell us about whatever changes you noticed on any social media platform you post to regularly, or used to post to regularly. Don't worry about right or wrong, we're

interested in whatever you think has changed. **Try to tell us as much as you can about as many platforms as you can - more is better!**

Okay, one more round - and think hard on this one! In addition to what you told us about on the last page, **are there any more changes you've noticed that specifically have to do with the way your content/posts gets distributed on social media platforms, or the way you think the platform works behind the scenes?** Remember, we're not interested in right or wrong, we're interested in what you've noticed, no matter how big or small.

You can use the same format as the last round: *platform, change I noticed, when I noticed it, how/why I noticed it, what I did about it.*

And the last question for today: reflecting on all the changes you just told us about, how do you, personally, feel about the platforms you talked about and how they work?

6.6   Week 6

6.6.1   Community Prompt (Facebook)

Hi Folks! It's week six, and after all the weeks of amazing stuff you've told us, it's time to get a little personal. That's why this week is a personal journal activity where we're asking you to tell us about your personal relationship to social media platforms, and how that relationship has changed over time. Don't worry about getting things right on a technical level here - this one is really about how you, personally, feel.

We broke the journal down into two parts to make it a little easier to do. As always, comment here or DM a study team member if you have any questions or concerns.

6.6.2   Full Prompt (Qualtrics)

Welcome to week six! This week is primarily about your feelings as they relate to the social media platforms you use, and the relationship you've had with the platforms over time - so it's time for a journal entry. We're going to do this in two parts to make it a little easier.

Remember, it's a journal, not a public blog post - you can get pretty personal here, because your feelings actually matter a lot, and just like your personal journal, this is confidential.

For the first part of your journal entry, we want you to **tell us about your personal relationship to the platform you post to the most.** You can go back as far as you think is useful – sometimes, our relationships with platforms are very long. Some things you might consider including:

- what you think about the platform
- how you feel about it
- what you think it's for
- if you've seen it change (and how you feel about/have dealt with those changes)

If there's stuff about the platform you love, tell us about it. Stuff that bugs you? Well, that's exactly what a journal is for.

As you write, take time to think about the platform itself, and especially how it gets your content to other people.

- **Has it changed as you've changed?**
- Has that always been a good thing - or were there problems?
- Have things you've heard or noticed about new features or policies, or changes to the way content gets distributed, changed how you make decisions, how you behave, or how you think about posting, for better or worse?

- How has your relationship with the platform evolved?

Now, for the second part of this journal entry, it's time to talk about the other social media platforms you use.

Tell us about your personal relationships to the other platforms you use, and how those relationships compare to your relationship with (secondary platforms). You might consider including a lot of the same things you considered when writing about (primary platform):

- how your feelings towards and what you think about these other platforms compares
- what you think these other platforms are for and how that's different than how you think about (primary platform)
- if you've seen different or similar kinds of changes compared to (primary platform) (and how you feel about/have dealt with those changes)

As you write, take time to think about these platforms, and especially how they get your content to other people. How does that compare to what's going on with (primary platform)?

- **Have these other platforms changed as you've changed?**
- How is that different than how (primary platform) has changed?
- If you did see change, what worked better or worse than with the changes you saw on (primary platform)?
- Compared to how you behave on (primary platform), how and why have you changed how you make decisions or think about posting?
- Overall - how have your relationships with these platforms evolved compared to your relationship with (primary platform).

6.6.3 Additional Items (Qualtrics)

Change uncertainty/fatigue items

6.7 Week 7

6.7.1 Community Prompt (Facebook)

Hi Folks! Week seven is upon us, and it's time to sound off to the people in charge of social media platforms themselves. This week, we want you to write a letter to a social media platform CEO of your choice, and then we'll help you break that down into the kind of "executive summary" most CEOs tend to read.

If you feel there are things they could do better to help you accomplish your goals, or if you feel like you've noticed changes on the platform that you weren't ready for, this is your opportunity to tell them what's up and how they can help you out. Or, if you feel like they're doing a great job, or that certain things have really helped you keep up with change or accomplish your goals, you can tell them that too. It's up to you! Be clear, be convincing, and be brutally honest.

Also, look out later this week for scheduling information on interviews, and info on how you get paid for all of this!

6.7.2 Full Prompt (Qualtrics)

Welcome to week seven, the last week of prompts! Thanks for sticking with us.

For this last week, we wanted to give you a chance to sound off to the people who actually make the big decisions about social media. This week is all about what you want and need from platforms, and who better to tell than the people in charge?

Write a letter to Mark Zuckerberg (Facebook, Instagram), Jack Dorsey (Twitter), Ben Silberman (Pinterest), Jeff D'Onofrio (Tumblr), or any platform leader of your choice, and let them know how you feel about their platform

If you feel there are things they could do better to help you accomplish your goals, or if you feel like you've noticed changes on the platform that you weren't ready for, this is your opportunity to tell them what's up and how they can help you out. Or, if you feel like they're doing a great job, or that certain things have really helped you keep up with change or accomplish your goals, you can tell them that too.

Remember, this is a letter, so you need to be **convincing** and **specific**. Feel free to illustrate with examples from your online life, and we'll put together a little "executive summary" on the next page to make everything clear. There's no bad ideas here – remember, you're the user, and you know what you want and need.

Thanks for writing that letter! Now, CEOs are pretty busy, and they often just wind up reading bullet points - so let's put together a little "executive summary" of some key information to make sure our message gets through. You can do each of these as bullet points.

- First, let the CEO know what you want in terms of learning about changes to how your content gets distributed to others once you post it:

- Now, let the CEO know what you want in terms of learning about policy and policy changes, including topics like content moderation:

- Finally, let the CEO know what you want in terms of the interface - how it looks, feels, and changes.

Appendix B: Platform Centrality Scale

7-point likert items with anchors strongly disagree to strongly agree

- My presence on (Platform) is an insignificant part of who I am. (reverse coded)

- My presence on (Platform) is a central part of my identity.

- To understand who I am as a person, it's important to see my content on

  (Platform).

- Being on (Platform) is a very important aspect of my life.

- I believe being on (Platform) is an important part of me.

- (Platform) is part of my everyday activity.

- I feel out of touch when I haven't logged on to (Platform) for a while.

- I would be sorry if (Platform) shut down.

- I feel I am part of the (Platform) community

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