Applications of Social Identity Theory to Research and Design in Social Computing

JOSEPH SEERING, Carnegie Mellon University, USA
FELICIA NG, Carnegie Mellon University, USA
ZHENG YAO, Carnegie Mellon University, USA
GEOFF KAUFMAN, Carnegie Mellon University, USA

Research in computer-supported cooperative work has historically focused on behaviors of individuals at scale, using frames of interpersonal interaction such as Goffman's theories of self-presentation. These frames prioritize research detailing the characteristics, personal identities, and behaviors of large numbers of interacting individuals, while the social identity concepts that lead to intra- and inter-group dynamics have received far less attention. We argue that the emergent properties of self-categorization and social identity, which are particularly fluid and complex in online spaces, provide a complementary perspective with which to re-examine traditional topics in social computing. We discuss the applicability of the Social Identity Perspective to both established and new research domains in CSCW, proposing alternative perspectives on self-presentation, social support, collaboration, misbehavior, and leadership. We propose a set of methodological considerations derived from this body of theories and accompanying empirical work. We close by considering how broad concepts and lessons from social identity provide a valuable lens for inspiring future work in CSCW.

CCS Concepts: • **Human-centered computing** → **HCI theory, concepts, and models**;

Keywords: Social identity theory; self-categorization theory; self-presentation; social support; collaboration; group conflict; leadership

1 INTRODUCTION

Research in Computer-Supported Cooperative Work (CSCW) has explored the evolution of collaboration and cooperation in online systems since the early years of social computing. Findings have guided the development of systems and the formulation of theoretical models explaining the ways humans engage with them. However, the major methodological and theoretical approaches within CSCW have focused on *individuals*, whether in groups or at scale, as the unit of analysis, rather than focusing specifically on *groups* and their participation within online spaces. From foundational theory in social psychology, we know that the process of transitioning into groups can mean that

Authors' addresses: Joseph Seering, Carnegie Mellon University, 5000 Forbes Avenue, Pittsburgh, PA, 15213, USA, jseering@cs.cmu.edu; Felicia Ng, Carnegie Mellon University, 5000 Forbes Avenue, Pittsburgh, PA, 15213, USA, fng@cs.cmu.edu; Zheng Yao, Carnegie Mellon University, 5000 Forbes Avenue, Pittsburgh, PA, 15213, USA, zyao2@cs.cmu.edu; Geoff Kaufman, Carnegie Mellon University, 5000 Forbes Avenue, Pittsburgh, PA, 15213, USA, gfk@cs.cmu.edu.

individuals' self-concept, their behaviors, and the motivations and values that drive them, are all profoundly transformed; groups are far more than the sum of their parts.

The social identity perspective (SIP)[1] explains how people organize themselves into and within groups and how they treat both members of their own groups and members of other groups. It identifies factors that cause variation in levels of attachment to and identification with a group, predictors of intra-group and intergroup conflict and the approaches groups take in responding to conflict, and variables that explain how social structures emerge within groups.

The aim of this paper is to provide a guide to using the social identity perspective as a lens for CSCW research. A focus on the social psychological mechanisms of group-level social processes is distinct from - but complementary to - a focus on individual-level processes, and is thus crucial for both the development of healthy social platforms and subsequent research informing our understanding of them. At the same time, it is important to acknowledge at the outset that the formation of groups and group identities is by no means an inevitable outcome in every online social context. As Kreijns, Kirschner, and Jochems note [80] in outlining pitfalls in designing computer-supported collaborative learning environments, designers too often take it for granted that social interactions occur simply because the platform is built with features that allow for them. Furthermore, even on platforms where social interactions do occur, there is no guarantee that meaningful social identities can and will be formed; individuals who are co-present or co-acting do not necessarily form a shared identity. Collectives of individuals on a site behave and interact very differently from members of tightly-knit groups. Thus, understanding how and when social identities are most likely to form, and their subsequent impact on individuals' perceptions, judgments, and behaviors, is a crucial starting point. We argue that the design and study of collaborative and social platforms will be significantly improved with a deeper insight regarding the foundations and consequences of social identity formation, which is vital for achieving a complete understanding of online communities and their members.

In this paper, we first review the social identity literature in more depth to bring attention to both core and lesser-known principles of the theory. With these principles in mind, we present a systematic review of social identity in current CSCW literature, identifying current "genres" of research that reference social identity. We then propose potential contributions of the social identity perspective to research in five different domains of CSCW: self-presentation, social support, collaboration, misbehavior, and leadership in online communities. We conclude with a set of methodological suggestions that might aid and inspire CSCW researchers to incorporate tools and techniques from the social identity literature or, at a broader level, to adopt an additional set of social identity perspectives, in their work.

2 CORE PRINCIPLES OF SOCIAL IDENTITY THEORY AND SUBTHEORIES

In this section we briefly review five sets of concepts from Social Identity literature that we suggest are most relevant to CSCW research. These principles, as well as the subsequent sections on their application, are presented in increasing order of the level of their application, progressing from a focus on the individual to a focus on the group as a whole.

> **Principle 0: A person's identity can be defined at various distinct levels, with the most common differentiation being between one's personal and social identities.**

---

[1]The term "SIP" includes the original social identity theory first proposed by Tajfel and Turner in the 1970s, but also broadly refers to theories built on this framework, including self-categorization theory, the social identity theory of leadership, and the social identity model of deindividuation effects (SIDE) and their various subprinciples. We refer to all of these under the general social identity umbrella.

The core of the Social Identity Perspective is the concept that people have many different identities and move between them fluidly and sometimes rapidly, depending on the level of identity activated by one's current situational context. In contrast to earlier social psychological models of the self, which focused on the personal (individuated) self-concept and characterized the self-concept as relatively stable, the social identity approach (and, in particular, self-categorization theory) argues that the self-concept also consists of a variety of *social* identities defined by one's group memberships and, moreover, conceptualized the self as fluid and dynamic [148, 150]. In this way, a person can possess a multitude of social identities based on the different groups of which they may be a part; moreover, these distinct identities can vary dynamically in their associated attributes and lead to the activation of different traits, goals, and orientations depending on the specific identity that is most salient at any given moment.

Social identity theory emerged out of early work in social psychology investigating the causes of prejudice (which itself resulted from efforts of psychologists to explain extreme and terrible examples of intergroup behavior that had occurred during the Holocaust). While the first wave of theories of prejudice that emerged in the post-World War II era were predominantly focused on individual-level cognitive processes, social identity theory emphasized the role of group membership in determining individual behaviors [69]. Early work on social identity theory in the late 1970s [143], 1980s [102, 149], and 1990s [2, 39, 40, 121] was primarily the domain of European social psychology and affiliated publication venues, but has since spread both to other parts of the world and into other fields, from communication [65] to organizational psychology [66].

> **Principle 1: The identities we tend to embody are those that are the most accessible and have the best "fit" within a given situation.**

According to this view, the distinction between personal and social identity reflects the aspects of the self that arise when one makes interpersonal (me versus not me) versus intergroup (us versus them) comparisons and judgments. In addition, this view posits that identity itself is context-dependent, with an inverse relationship between the salience of one level of identity versus the other [114]. Indeed, the principles of accessibility and fit, as elaborated in [65], describe the types of identities that are likely to be most salient at any given time. People draw on accessible identities - those that are important to the individual and connected to their self-concept, and those that are activated by current goals or social context (e.g., the composition of one's immediate context). Race and gender are common identity categories that match both of these criteria, particularly for oppressed or marginalized groups, because of their likelihood to be important to the individual and because of how frequently they arise in everyday life.

Optimal distinctiveness theory [16, 17, 19] elaborates on a core principle of social identity perspective - that the self-concept can be differentiated by multiple levels of identity (from individual to collective) in arguing that definitions of self and behaviors within groups are informed by a chronic tension between innate, opposing needs for distinctiveness and inclusiveness. Feeling overly unique can make us feel anxious and susceptible to alienation and isolation, triggering a drive to achieve greater inclusiveness (which can be satisfied by identifying or affirming one's affiliation with a social identity group or category). Conversely, if we feel hyper-assimilated or indistinguishable within the group, this triggers the drive to assert our distinctiveness (e.g., to enable an evaluation of self that relies on comparison to others). In this way, optimal distinctiveness theory predicts that judgments of accessibility and fit can be based on our current need for uniqueness or inclusion.

> **Principle 2: Individuals consistently favor groups and identities with which they affiliate over competing or contrasting groups.**

The minimal group paradigm [35], one of the earliest areas of Social Identity Theory, explores the smallest possible conditions that are required to cause intergroup differentiation and ingroup favoritism. In one famous experiment [11], participants were assigned to groups randomly, based on the result of a coin flip, and told to allocate points between their own group and the other group. Participants did not know who else within the session was in their group; the groups had no history and no future, and were based on meaningless criteria; no particular competition was suggested between the groups; and points were meaningless and carried no inherent value. Nonetheless, participants still consistently allocated more points to their own group in all variations of the experiment. Even in groups formed on a random or arbitrary basis, patterns of ingroup favoritism consistently emerged. When the strength of affiliation between group members increases, ingroup favoritism only increases; as work on Social Identity has firmly established, people like others who are similar to them in salient ways and are innately inclined to form group boundaries when contexts make social categories salient.

The original core premises of social identity theory were derived from Tajfel and Turner's work on intergroup relations [143]. Though the Social Identity Perspective no longer relies on the concept of minimal groups, a wide variety of studies have shown similar effects across different domains, particularly in the context of stereotypes. Several conditions must be met for these processes to take place [143]. Individuals must have internalized membership in the relevant group as part of their self-concept. They also must have cause for comparison, and comparison must occur across attributes that matter in a given context (e.g., gender in a science classroom, political affiliation in a Facebook group centered on immigration issues) and with an outgroup that is relevant to the comparison and situation. Recent research suggests that the attributes that hold the most weight in comparisons are ones pertaining to perceived morality (rather than perceived competence or sociability) [86].

Principle 3: Anonymity leads to behaviors more strongly prototypical of group norms.

The Social Identity Model of Deindividuation (SIDE) was developed starting in the 1990s as a counterpoint to earlier work on the psychology of mobs [121]. Reicher, Spears, and Postmes trace the concept of deindividuation in psychology back to the work of LeBon on crowd psychology, published in France in 1895. The core of LeBon's theory was that to be in a crowd was to lose one's individuality and thus any sense of individual responsibility, and therefore to succumb to base behaviors. Further well-known work on anonymity and deindividuation such as the Stanford Prison Experiment, reinforced this widely held view of deindividuation [167].

The SIDE model emerged as a critique of these interpretations, and was founded on a number of experiments that showed that deindividuation (specifically via anonymity in face-to-face conditions) led experimental participants to behave in ways that were more in line with norms for their group, regardless of whether those norms were pro- or anti-social [121]. These findings have been extended to CMC contexts [118, 119]. A recent meta-analysis confirmed these findings [71]: based on thirteen journal articles, a positive correlation was found between anonymity and conformity, which was moderated by the presence of an outgroup; when anonymous participants were aware of an outgroup, the conformity effect was twice as large as when they were not. Thus, in cases where norms are founded on harassment or disruptive behaviors, anonymity can lead to extreme negative behaviors, while in supportive online communities, anonymity promotes pro-social outcomes, such as greater compassion and empathy.

Principle 4: In groups, the leaders who emerge are the members who are most prototypical of the group's norms

In contrast to theories of leadership that suggest that leaders are those who have personality traits relevant to leadership or that group members with the greatest access to resources, the social identity theory of leadership argues that group members who are the most prototypical of group norms emerge as leaders [63, 66]. This process has three defining phases: first, self-categorization creates a spectrum of prototypicality within the group, with certain members deemed to be more prototypical than others. Second, per the social attraction hypothesis, more prototypical group members are liked more than less prototypical members, and are thus able to exercise influence over other group members because individuals are more likely to help and support people that they like [64]. As the group reaches general (though often not consciously discussed) consensus regarding who is most liked, this person becomes more and more able to exercise power in ways that cement their status. Third, group members make an attribution error [143] by overattributing a leader's position to their personality characteristics rather than their prototypicality, reinforcing the belief that the leader possesses a particular disposition that helped them achieve their status within the group. It is important to note that, while individuals' cognitive representations of prototypical qualities of groups and group norms are conceptually very similar, they are not entirely the same- group norms are better conceptualized as the the aggregation of individual prototypes into collectively agreed upon group prototypes [65].

3 SOCIAL IDENTITY INFLUENCES ON CSCW

Before considering specific principles of social identity and their applications to CSCW, it is important to identity specific research contributions that have already been guided by SIP. We identified five ACM conferences and two non-ACM conferences with the highest presence of CSCW work as locations for a literature search: the ACM Conference on Computer-Supported Cooperative Work and Social Computing (CSCW); European Computer-Supported Cooperative Work (ECSCW); the International Conference on Web and Social Media (ICWSM); the ACM Conference on Human Factors in Computing Systems (CHI); the ACM International Conference on Supporting Group Work (GROUP); the ACM Creativity and Cognition Conference (C&C); and the ACM SIGCHI Conference on Designing Interactive Systems (DIS). Though establishing boundaries for search is necessary, selecting specific venues on which to focus is not entirely straightforward; work that might reasonably be considered to be CSCW research likely appears in dozens of conferences and numerous journals. We focused our search here on the core of CSCW research built around the ACM CSCW conference and adjacent venues, where we feel that principles of social identity have the most potential to impact research directions.

We began with a search of the ACM Guide to Computing Literature following procedures used in existing literature reviews [12, 37]. We searched using the phrase "social identity", which returned 72 results. We identified fourteen of the most highly influential and most frequently cited papers within the Social Identity literature (see Table 1, and we manually searched the 72 papers for citations of any of these fourteen papers. While numerous papers used the phrase "social identity", nearly all used it in a general sense, meaning the broad identity of users in social settings, rather than in a sense specifically tied to the Social Identity Perspective [57, 75]. Because this search only returned a handful of results that engaged with Social Identity literature, we elected to pursue a broader search.

In order to capture a broader set of work, we searched through the "Cited by ..." section for each of the fourteen seed papers on Google Scholar using the queries shown in Table 2. We elected to exclude extended abstracts and workshop papers from our search.

Following our search by citations, we returned to the ACM Guide to Computing Literature as a check on our results. Through manual search of the references in the 72 aforementioned papers for the fourteen major works, we identified no additional papers that had not been found through our

Table 1. Major work in SIP used as seeds for Literature Review

Author(s)	Year	Title
Tajfel, H. [140]	1974	Social identity and intergroup behaviour
Tajfel, H., & Turner, J. C. [143]	1979	An integrative theory of intergroup conflict
Tajfel, H. [142]	1982	Social psychology of intergroup relations
Tajfel, H. [141]	1982	Social identity and intergroup relations
Tajfel, H., & Turner, J. C. [144]	1986	The Social Identity Theory of Intergroup Behavior
Turner, J. C., et al. [149]	1987	Rediscovering the social group: A self-categorization theory
Ashforth, B. E., & Mael, F. [7]	1989	Social identity theory and the organization.
Brewer, M. B. [16]	1991	The social self: On being the same and different at the same time
Reicher, S. D., Spears, R., & Postmes, T.[121]	1995	A social identity model of deindividuation phenomena
Brewer, M. B., & Gardner, W.[18]	1996	Who is this "We"? Levels of collective identity and self representations
Ellemers, N., Kortekaas, P., & Ouwerkerk, J. W.[40]	1999	Self-categorization, commitment to the group and social self-esteem as related but distinct aspects of social identity
Hogg, M. A., & Terry, D. I.[66]	2000	Social identity and self-categorization processes in organizational contexts
Hogg, M. A. [63]	2001	A social identity theory of leadership
Ellemers, N., Spears, R., & Doosje, B.[41]	2002	Self and social identity

Table 2. Queries used for Google Scholar search

Query terms for searches in Google Scholar	
ACM	Human factors in computing systems
Creativity and Cognition	CHI
Creativity & Cognition	SIGCHI
ACM C&C	ACM CHI
C&C	Human Computer Interaction
ACM CSCW	Computer Human Interaction
CSCW	ACM DIS
Computer supported cooperative work	Designing Interactive Systems
SIGGROUP	DIS
ACM GROUP	ICWSM
International Conference on	International Conference on
-Supporting Group Work	-Web and Social Media
Supporting	ECSCW

citation-based search. In total, we identified 57 papers from these five conferences that cited major works in SIP. Breakdown by conference is listed in Table 3, and breakdown by year and conference is shown in Fig 1. A full list of all papers identified is shown in Appendix A.

Table 3. Number of papers by conference

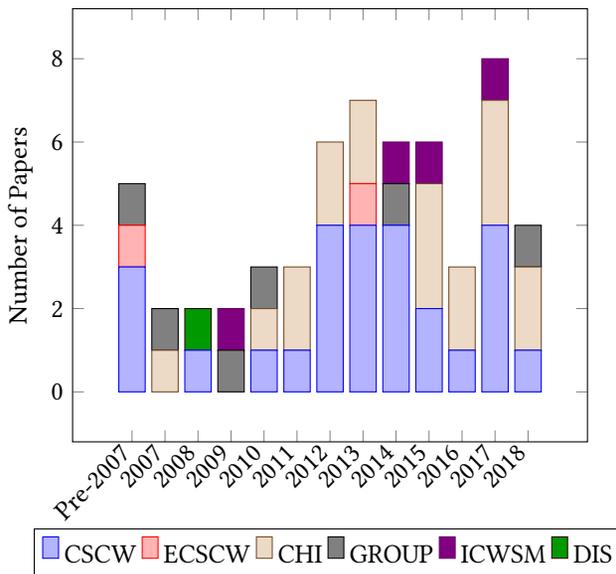| Venue	Number of Papers
CSCW	26
ECSCW	2
CHI	18
GROUP	6
ICWSM	4
DIS	1
C&C	0
Total	57

Fig. 1. Number of papers by conference by year

3.1 Genres of SIP research in CSCW

While the purpose of this paper is to provide a guide to future SIP-guided research in CSCW rather than to classify existing research, we suggest that it is useful to begin with a basic understanding of what types of work have already been done in order to identify areas for growth. To classify the existing SIP research in CSCW, we modeled our process after past literature reviews that have identified sub-areas within other domains of HCI research. For example, in their review of HCI research in sustainability, DiSalvo, Sengers, and Brynjarsdóttir identified four non-mutually-exclusive "genres", or "emergent clusters of research that draw from similar sources, share a general problem formulation, and have similar ideas of how to approach solving those problems" [37]. They identify "Persuasive technology", "Ambient awareness", "Sustainable interaction design", "Formative user studies", and "Pervasive and Participatory Sensing" as genres within the sustainability research space in HCI.

In order to create a classification, we analyzed each paper using four questions, using the model used in [37]. These were: (1) Which theoretical construct within SIP is used to frame the work? (2) What is the unit of analysis of the work (e.g., individual, group, or crowd)? (3) What identity characteristics were varied or studied? (4) What was the stated goal of the work (e.g., to facilitate increased productivity, to reduce conflict, to understand experiences)? We identified four *non-mutually-exclusive* "genres" that included five or more papers. The rest of this section describes the genres that resulted from our analysis.

3.1.1 Factors in productivity of distributed groups. Given the history of CSCW research, it is unsurprising that the primary area in which the Social Identity Perspective has been applied is in identifying factors that lead to success in distributed groups. Thirty-two (56%) of the papers in our corpus were based in this area, using various methods and focusing on different populations. Many focus on online peer production communities; Settles and Dow [135] explored a collaborative songwriting community, while Vasilescu et al. [152] focused on impact of diversity in Github teams and Zhu, Kraut, and Kittur [166] and [163] examined group identification in Wikiprojects. These papers primarily used large-scale scraping of data, though Vasilescu et al. and [46] make use of surveys for their work on GitHub.

A relatively small number of papers have used social identity as a lens to understand dynamics in studies within companies. Muller et al. [111] looked at the impact of similarity in identity facets in IBM employees on crowdsourced funding of projects. Halgin, Gopalakrishnan, and Borgatti examined factors affecting turnover in employees associated with a client account in a "global technology firm". Robert Jr. and You [129] examined the relationship between geographic dispersion, reliance on electronic communication, and team identity in employees of an "information technology solution vendor". These again rely on large scale collection of quantitative data and, in some cases, surveys. They also looked at different facets of identity, from role similarity to geographic proximity to team identification.

Though controlled experiments are a dominant paradigm in social psychology literature in social identity, they have only rarely been used to examine social identity within CSCW. Of these experiments, most use virtual laboratory settings with students as participants. Bos et al. [13] ran an experiment with participants playing a collaborative game to explore whether co-located participants would be more likely to collaborate with each other than with non-co-located participants. Voida et al. [154] examined teams of students' success in the same game, varying co-location and shared identity (based on campus organization affiliation), finding that shared identity can mitigate the negative impact of distance. Bos et al. use social identity to explain increased collaboration with co-located participants as formation of an ingroup, and Voida et al. add shared identity via organizational affiliation.

It is important to note the impact in this area of theory on bond-based and identity-based attachment to groups, introduced in other social-computing related publication venues primarily by [123], [122] and [132]. Common identity and bond theory distinguishes motivations to join groups based on connections to individual members versus connections to the group as a whole, drawing from some social identity and self-categorization principles previously applied in organizational contexts by Hogg and Terry [66], and by Rogers and Lea [131]. Most papers that have applied this theory have investigated outcomes related to productivity in distributed groups; several papers in CSCW resesarch cite Ren, Kraut and Kiesler [123] or Ren et al. [122] to discuss these topics, from Farzan et al.'s examination of the role of social presence in commitment to communities [44] to Tauszik, Dabbish, and Kraut's experimental analysis of attachment to sub-groups [145], but because this theory is adjacent to but not within social identity we do not include these citations in our count here.

There are many facets of social identity that remain to be explored in each of these contexts. While participants in a number of these studies were anonymous to each other, variation of levels of anonymity could be explored much further as an independent variable in success of distributed teams. Moreover, homophily in identity characteristics, such as race and gender, has only been touched on briefly [46]. Robert Jr. explored the impact of shared leadership on success and satisfaction in distributed student project teams [127], including race and gender as factors, but there is also much more room for exploration of impact of different types of leadership on success in distributed groups. Section 4 of this paper identifies specific areas for future exploration.

3.1.2 Identity building and expression. The remaining three groups were much smaller, with each comprising 10% or less of the corpus. As such, we describe each briefly here but offer potential areas for further exploration within each in Section 4 of this paper.

We identified five papers (9% of the corpus) that focused on how users build identities and express either their own personal identities or newly developed identities online, usually in social settings. Three of these papers looked at individual experiences with identity expression in gaming or game-related environments. Margolin, Liao, and Lin [100] found that fans of National Football League teams talk more on Twitter about their teams on Twitter after team victories, a finding that can be explained by the concept of positive social identity. Livingston et al. [93] explored the ways in which players value their World of Warcraft characters, finding that self-expression was an important part of characters' value. Passmore, Birk, and Mandryk [117] surveyed players on their perceptions of and experiences with underrepresentation of people of color in games, finding significant impact of membership in different groups.

Beyond games, other work has examined intergroup perceptions and relationships on social contexts. Early work from Pape, et al. [116] explored an online community made available only to a specific subset of students at a university, and the impact this separation had on group identity and ingroup/outgroup relationships. Liu et al. [91] interviewed participants and non-participants of the #ILookLikeAnEngineer hashtag movement, finding ways in which the movement impacted their feelings about their relationship with their own and others' identities. These studies used a variety of methods, from quantitative analyses [100] to surveys [117] and interviews [91, 93, 116], though none have yet used experiments to study social identity building and expression.

3.1.3 Multiple identities and context collapse. As we discuss in Section 4.1 of this paper, there is significant overlap and interplay between social identity and the concept of context collapse [14, 103]. Six papers in our corpus (10%) have begun a preliminary exploration of this line of research. Lampinen, Tamminen, and Oulasvirta [84] provide an excellent overview of this area in early work on multiple group memberships on Facebook:

> *Users deal with group co-presence by managing the situation to prevent anticipated conflictive and identity-threatening situations. Their behavioral strategies consist of dividing the platform into separate spaces, using suitable channels of communication, and performing self censorship.*

Farnham and Churchill [43] built on this work by identifying factors impacting the number of separate identity "facets" and strategies for managing them, while Leshed and MacLeod [89] examined metaphors for identity management in social relationships online. Voida, Olson, and Olson [156] looked at connections between identity facets and use of different cloud-based services (e.g., Google Apps). Taking a computational approach, Min et al. [108] successfully classified social contacts according to identity facet (e.g., family, work, or social).

Given the broad variety of work on context collapse and its growing relevance due to growing use of multiple platforms for self-expression, the intersection of social identity and context collapse

is a promising direction for research. We present hypotheses in section 4.1 that aim to provoke future thought in this area.

3.1.4   Uses and consequences of anonymity. The final genre that we identified in our corpus, heavily influenced by Reicher, Spears, and Postmes's model of social identity and deindividuation effects (SIDE) [121], includes six papers (10%) that explore anonymity online. Two papers explored or considered the impact of anonymity: Foong et al. [48] presented a framework for a number of socio-psychological factors that may impact feedback exchange, of which anonymity is one. They identified platforms with various approaches to anonymity, as well as prior work that has considered the impact of anonymity, though not through a social identity lens. They conclude that there remains room for more exploration of the impact of anonymity on feedback. Ma, Hancock, and Naaman [97] performed an experiment to understand the impact of anonymity and intimacy on self-disclosure, finding that anonymity can increase baseline levels of self-disclosure and sometimes weakens self-regulation in disclosure.

The remaining four papers explore uses of anonymity in existing contexts. Rho et al. [125] studied a confessional Facebook group for low-income and first generation students at an elite university, finding anonymity to be crucial to their ability to share their experiences and request information and that the moderation structures in the group are important to managing this anonymity. Similarly, Leavitt [88] found that reddit users utilize "throwaway" temporary accounts to talk about topics that they'd rather keep private, particularly when they feel that they are identifiable on their primary accounts. On the other hand, Kwak, Blackburn, and Han [81] discussed the role of anonymity in harassment in an online team game, identifying possible effects of anonymity on likelihood to report toxic players.

While most of these papers explored different online contexts where anonymity facilitates certain social behaviors, only one, by Ma, Hancock, and Namaan [97] explicitly compared anonymous vs non-anonymous populations. Huang and Li [71], in a 2016 paper published in the International Journal of Communication, provide a starting point for bridging anonymity research in social psychology and investigations of online socialization in CSCW. They performed a meta-analysis of the impact of anonymity on discussions in online contexts, finding results consistent with the SIDE model [121], but none of the thirteen studies included in the meta-analysis were part of the CSCW research space and only one [147] considers a context outside of lab environments (Wikipedia). The strength of CSCW research in analysis of active social and productive spaces online could contribute much to furthering SIDE theory.

3.1.5   Emerging directions. Eight papers (14%) in our corpus did not fall into any of the above categories. These include, for example, Seering, Kraut, and Dabbish [134], who consider the impact of group leaders in online chatrooms in encouraging or discouraging misbehavior, opening possibilities for applications of Hogg's [63] social identity theory of leadership to topics like harassment. In a very different line of work, Maldeniya et al. [98] apply the principles of homophily and optimal distinctiveness to analysis of online dating, finding that overtures are most likely to receive a response when their linguistic style is similar to the person they are messaging but different than their "competitors".

Though a number of strong results have been identified in the literature discussed above, many of these examples utilize well known or widely-influential concepts from social identity. We argue that there are many concepts from the social identity perspective and its vast literature that have yet to be and ought to be explored and applied more regularly in CSCW research. We address five domains in which there is room for further exploration in the next section.

4 SOCIAL IDENTITY AND DOMAINS OF CSCW

In this section we focus on applications of the theory that could push existing domains in new directions, but we first ground our argument by connecting the social identity perspective to a classic framing of CSCW as a field - Ackerman's *The intellectual challenge of CSCW: the gap between social requirements and technical feasibility* [3]. Ackerman's nine assumptions provided a clear framing for CSCW research that remain relevant today. Three of Ackerman's assumptions have nearly identical corresponding theoretical principles in social identity:

First, CSCW researchers assume that "Social activity is fluid and nuanced", Ackerman notes that, per Goffman, individuals often choose to share different information with different audiences, and that social-technical systems often assume a level of shared understanding of information that is not found in many social interactions. Social identity theory, per the mechanism of social comparison [143] explains how different individuals will interpret even factual information significantly differently if it in any way relates to an evaluation of groups of which they are a part.

Second, the potential for conflict in this dynamic is made clear by Ackerman's subsequent assertion that CSCW researchers assume that "Groups and organizations may not have shared goals, knowledge, meanings, and histories". Social identity theory explains how groups with conflicting goals will characterize each other's members, and how groups with less power will attempt to reconcile the power gap [143].

Thirdly, Ackerman says that CSCW researchers assume that "The norms for using a CSCW system are often actively negotiated among users," and self-categorization theory explains in depth the mechanisms by which these norms are established and negotiated. In particular, self-categorization theory explains the mechanisms by which group polarization occurs [67], which are particularly relevant to political polarization observable in a variety of social media spaces (e.g., [162].

However, Ackerman did not root any of these assumptions in theory from the Social Identity Perspective, so these ties were not made explicitly or tied to their history of study in psychology in his core characterization of the field. We suggest in this section not only that certain principles from social identity can apply to specific areas, but that they can connect very distinct areas of research that have not yet interacted substantially. For example, many of the theories that we apply to work on social support apply equally well to distributed work teams and crowdwork tasks where workers interact with one another or with each other's work.

We discuss applications to existing domains of CSCW beginning with individual-level goals and behaviors within the group via self-presentation and impression management, and progressing to higher-level group characteristics and processes such as social support, collaboration, and misbehavior, and finally to a top-level view of group dynamics through a discussion of leadership.

4.1 Self-presentation and impression management

The concepts of self-presentation and impression management within CSCW research have been built in large part on the frameworks for self-presentation developed by Goffman [51], who takes a theatrical perspective on social interactions. Goffman describes individuals as performers on a stage who play to their various audiences but who have an authentic identity that can present itself when "backstage" . According to the social identity perspective, the selves that emerge in different contexts are all "authentic" in the sense that they reflect different levels of identity, and that our "performance" of these selves is dictated by which levels are most salient in a given context. Both theoretical framings assert that individuals behave significantly differently depending on the group in which they are interacting; Goffman frames this as a performance, but social identity theory frames this as internalization of or adherence to group norms [149]. Goffman's extension of the theater metaphor to talking about groups of "actors" negotiating shared understandings

of situations is explained in self-categorization theory as the emergence of norms in groups as a function of their developing social identity and group prototype. The social identity perspective offers an important framing that could be applied in most cases where Goffman is currently used - we act differently when in different groups, but this is because each social group makes a different, real, and authentic part of us accessible and salient.

The "imagined audience" framing of impression management [90, 103] also overlaps significantly with principles of social identity. For example, research on users' restrictions on intended audiences, as in the case of transgender individuals who transitioned while on Facebook, found strategies for management that included editing data about prior identity and restricting access to this data [56]. This is echoed in research on young adults' management of prior identities, which also notes that past self-presentation data can be used to critique current identity but that this is often done playfully [133]. Together, these examples argue for the role of integration of platform characteristics into social identities. We argue for a concept of the "social role of apps" in determining both how users' identities are presented to different groups and even how these identities develop as a result. We argue that social identities online include more than just people - the technologies and apps via which people communicate are similarly present in determining group prototypes. These prototypes are heavily informed and characterized by the norms of interaction associated with the site or app (e.g., the modalities of communication available, the perceived goals or constraints of self-expression, the overarching ethos of the platform itself). It is important to acknowledge that the relationship between platform features and user psychology is likely to be bidirectional: the interaction norms associated with a platform likely invite some degree of self-selection of users (i.e., individuals who find those norms to be compatible with their own personality traits or communication styles), while, at the same time, those norms can influence the behaviors and self-perceptions of most users regardless of their traits or predispositions. The former perspective is more the purview of theories from personality psychology, which prioritizes a focus on individual differences in predicting and explaining behaviors and motivations. The latter is more aligned with the focus of SIP (and of theories from social psychology in general), which explains how the average individual's behaviors and identities are impacted by salient features of the group context and the expectations that define the prototypical group member in that context.

> **H1. A group of users will have different group prototypes depending on what site or app they are using to communicate.**

It is also crucial to reflect on the fact that, in addition to the social identities that come to be associated with particular interaction technologies, that the use of those technologies often entails a triggering of multiple additional social identities associated with the groups with whom one is interacting and the characteristics that define them (e.g., social relationships between the user and the group; the demographic, social, or ideological variables that define group members, etc.) . Perhaps the most interesting overlap between the social identity perspective and self-presentation in this regard is in the area of context collapse [14, 103], which describes the challenge in presenting an authentic self in the face of many different potential audiences. Self-categorization theory explains in depth how membership in a group substitutes group identity for individual identity [149], but it remains an open question which identity dominates (if any) when users are made aware of many group memberships in rapid succession (as in the case of scrolling through a Facebook newsfeed). Is the result of this an open "hybrid identity" that combines the most salient characteristics of all of the group identities? Do the strongest group ties, or perhaps the groups with strongest penalties for deviance, dominate? Or does the platform itself have its own norms for self-presentation that can override the salience of norms associated with group memberships primed by the content one encounters in a newsfeed? In addition, the increasing interconnectedness of social media

platforms and interaction technologies (with the same content shared across multiple sites with often overlapping but somewhat distinct audiences) contributes even more complexity to the mix. How do users negotiate the potentially divergent identity-related demands or expectations associated with these platform and the social circles they inhabit on them? Will the growing ecosystem of communication sites and apps contribute to a higher-level social identity informed by characteristics and features shared across different platforms?

The work detailed above offers a clue, in that impression management strategies may aid in easing the psychological difficulty of self-categorization by separating different identities onto different platforms [32, 43], or into different temporal categories [56, 133]. This suggests that users may actually seek to decrease their cognitive load by pushing self-categorization processes to occur during inter-app switching rather than constantly as they scroll down their newsfeed, which would help explain identity-separation processes.

> **H2. Users have distinct self-categorizations associated with particular apps. Switching between apps, or between different group contexts within the same app, will trigger a shift in self-categorization and greater adherence to the self-presentation and communication norms associated with the specific social identity that is most salient.**

As noted earlier in our discussion of Principles 0 and 1, a core finding of SIP is that group contexts can trigger a shift in an individual's level of identity, away from uniquely defining characteristics of one's personal identity and toward the shared, prototypical characteristics that define one's social identities [137, 138, 146]. Moreover, these levels of identity can be extremely fluid and dynamic, meaning that even small changes to a social context can make a specific social identity more salient or distinct [19]. Research, including much of the above, has shown that individuals maintain separate personas and interact with separate social groups using separate means of expressions across different social media platforms [32]. Through long-term exposure to these differences, we hypothesize that these platforms become the key to accessing a particular persona, which is made salient simply by logging in or opening the app. Brief use of one of them will make the associated persona more accessible. Beyond even the user adjusting their behavior to lead to platform-based rewards (e.g., taking pictures of food for Instagram, or even attending certain events because they know Facebook will allow their participation to be made widely known), long-term use of certain apps over others may have carryover effects on users' behaviors and motivations in offline contexts, such as influencing the way users experience, document, or reflect on particular real-life social situations. This may be particularly likely for users whose personality traits influenced their choice of platform in the first place; nonetheless, as discussed above, SIP would predict that the internalization of norms from a social context can lead to lasting changes for most individuals immersed in a group or social context. How long-lasting such changes are likely to be when triggered by an interaction technology or communication platform - and how much transfer between online and offline contexts is likely to occur - remain as open empirical questions.

4.2 Social support

Previous work on social support has focused on how individual behaviors or interpersonal interactions between group members, such as self-disclosure [30, 157], tenure [159], technology preferences [115] and communication pattern [161] could affect the type and the amount of support they shall receive. Social identity theory, on the other hand, explains how group attributes and contexts affect support through processes like intragroup favoritism. We frame our exploration here around three questions: First, what types of groups lead to highest levels of social support as a result of a strong, shared social identity? Second, what processes within groups lead to stronger

social identity that further elicit greater social support? Third, what are the effects of social identity on social support, both in magnitude and type?

We begin with the composition of the group. Ingroup favoritism theory suggests that people prefer those who share common identity attributes and thus seek to affiliate with people like them [143]. This principle applies particularly well in the online sphere, where the membership to online communities is usually voluntary and self-selected. The low entry barriers of online communities allow members to quickly join or leave a group without having to pay a fee or spend much time. There is little cost to trying out many groups until one finds a group that fits one's identity needs sufficiently well. Achieving such fit makes it easier for individuals to behave in accordance with their group membership and show higher level of group solidarity and higher commitment [40].

However, identity fit only tells part of story; for communities to succeed, there is also a need for balance between individual and group level identities in building stronger group identity and attracting appropriate new members. Optimal distinctiveness refers to the social psychological theory asserting that individuals desire to attain an optimal balance of inclusion and distinctiveness within and between social groups and situations [19]. Social identification - and, thus, mutually supportive behaviors - should be strongest for social groups whose level of inclusiveness can resolve the conflict between needs for differentiation of the self and assimilation with others.

> **H3. Groups that are "optimally distinct" will attract members who are most likely to support each other, and growth in a group that reduces certainty about group prototypes will reduce the prevalence of socially-supportive behaviors.**

Group members are naturally motivated to think of the groups to which they belong positively, thus enhancing their positive self-concept. Members who view their groups negatively have three options, per Tajfel and Turner [143]: first, they can drop out; second, they can attempt to make positive comparisons to an outgroup; and third, they can attempt to make positive social change that enhances the status of their group. When there are many groups with very similar characteristics and identities, as on Facebook, the third of these options becomes difficult without a very specific axis through which to evaluate their group and compare to outgroups.

Via the second of these processes, the presence of an outgroup leads to stronger social identity within a given group. Social comparison theory suggests that people evaluate their group with reference to relevant outgroups, and groups become psychologically real only when defined in comparison to other groups [45]. Specifically, group members are motivated to think and act in ways that achieve or maintain a positive distinctiveness between one's own group and relevant outgroups. Per Tajfel and Turner [143], groups with strong shared identity tend to display greater ingroup favoritism, which we connect here to social support:

> **H4. The presence of an outgroup leads to stronger social support in online groups, but the presence of many outgroups can lead to weaker social support as specific, meaningful comparisons become difficult.**

When the existing status hierarchy or dominant measures for intergroup comparisons do not favor the ingroup, members can choose to be engaged in changing the current social order, which also can lead to stronger and more positive social identity. Recent CSCW work, in particular, has paid significant attention to social movements aiming for collective social justice such as #BlackLivesMatter [139], #ILookLikeAnEngineer[91], and most recently #MeToo. Findings from these research indicate that although members may only be loosely connected (typically through the use of hashtags), their shared social identity is stronger in that they share the same goal of advocating for their place in the social hierarchy. Participants in the #BlackLivesMatter movement, for example, demonstrated a higher usage of first person plural pronouns [31] and were more likely

to embed hashtags within their profile description [139], both of which indicate a stronger social identity.

Current theory indicates that tightly-knit identity-based groups (compared to non-identity-based groups) would provide each other greater support on their group's focal task when advocating for a cause. We further extend this and propose that within identity-based groups, those whose focal task aligns with their identity characteristics will be more likely to provide each other with task-based support and non task-based support. For example, when comparing a Facebook group for women raising awareness of local recycling issues to a group for women advocating for more women in STEM, members of the latter would be more likely to give each other both task-based support (e.g, co-writing editorials or organizing rallies) and non task-based support (e.g., helping another member with a home renovation).

> **H5. Groups with focal tasks aligned with their dominant identity characteristics will provide each other with more task-based and non task-based support.**

Strong and positive social identity in groups can lead to several positive outcomes desired by community designers, including social support and reciprocity. Indirect reciprocity (also called "network generalized exchange") [110] follows a one-to-many pattern, as distinguished from direct, or one-to-one reciprocity. Lampien et al., has found this pattern in online exchange platforms such as Kassi, where members regard indirect exchange as a non-self-evident way to pay back to the community [83]. Similarly, Liu et al. found indirect reciprocity in support groups for people with disabilities leads to the spreading out of benefits to more members of the community, which further strengthens the community [92].

Drawing from self-categorization theory [149], we suggest that strong identification with a group leads to seeing other members as interchangeable versions of the group prototype. Therefore, individuals in groups in this state will be more likely to engage in indirect, one-to-many reciprocity; because members are interchangeable, a favor can be repaid to any other member.

> **H6. Within a group, strong social identity leads to an increase in one-to-many reciprocity relative to one-to-one reciprocity.**

4.3 Distributed work

The field of CSCW research was founded on the study of how new communication and collaboration technologies impact distributed work. Today, one of the most prolific areas of research on distributed work revolves around crowdwork, and most recently, the development of new crowdsourcing processes for complex tasks that have previously only been done by expert individuals or small groups. For example, research around flash teams and flash organizations [124, 151] as well as around distributed cognition systems for sensemaking and innovation [55, 164] have expanded the potential of breaking down large complex tasks into smaller subtasks or roles and delegating each to large numbers of remote individuals to complete in either sequential or dynamically rearranging workflows.

Earlier work on conflict in distributed teams offers a bridge between current work on crowdsourcing and social identity theory, examining in depth the various features of distributed work that lead to and mitigate different types of conflict. For example, Hinds and Bailey [59] propose early relationships between distance and technology mediation of communication (CMC), and task, affective, and process conflict. In subsequent work, Hinds and Mortensen [60] found increased task and affective conflict in distributed teams, and that a lack of shared identity exacerbates the negative effects on affective conflict, while a lack of shared context exacerbates the negative effects on both task and affective conflict. However, they also found that spontaneous communication can mitigate some of these negative effects. Given that crowdworkers who are completing separate subtasks

in a distributed workflow are typically geographically distributed and do not have spontaneous communication with one another, it is likely that they will experience more difficulties with conflict and coordination. For example, individuals assigned to subtasks within a distributed workflow may not be willing to accept the output passed to them from prior individuals in the workflow for a variety of possible reasons, including but not limited to perceptions of low quality output from prior workers, low social trust in prior workers, low motivation to spend effort processing prior worker's output, and other social cognitive factors. Based on [60, 99], it is also likely that crowdworkers will feel a general lack of shared identity with their co-workers as compared to colleagues in an offline environment, leading to a lower opinion of them [143]. These barriers to information transfer can all cause discontinuities in distributed workflows and undermine their potential for success.

We propose that social identity theory can be applied to understand and influence these new challenges that have not been directly addressed yet in CSCW research. While the general thrust of Principle 1 states that people like other people who are similar to them in salient ways [143], we suggest that perceived characteristics of the task at hand will determine which ways are most relevant in the immediate situation. We predict that task characteristics will mediate the impact of interpersonal rapport and ingroup prototypicality [63, 143] on collaboration within tasks.

> **H7. In distributed workflows, if a task activates *personal identity*, e.g., asking a user to contribute based on their individual expertise or experience, workers are more likely to build on prior workers' efforts if they have good rapport with that individual.**

> **H8. In distributed workflows, if a task activates *social identity*, e.g., asking a user to perform a task for or about a group they are a part of, workers are more likely to build on prior workers' efforts if they feel that the prior workers are prototypical members of this group.**

The two hypotheses above in turn suggest new design strategies for tackling challenges with information transfer between workers in distributed workflows. For example, the output of previous workers could be presented to new workers in a way that highlights important identity-related similarities between consecutive workers, or the task could be framed to workers in a way that emphasizes important social identities and minimizes personal identities. We argue through these examples that applications of social identity theory can carry great generative value in terms of identifying and expanding upon new research directions around established domains such as distributed work and crowdwork.

4.4 Moderation and antisocial behaviors

While previous sections have discussed established areas of research in CSCW, here we consider an up and coming area of work. Very early work in computer-mediated communication (CMC) explored how interpersonal behaviors online differed from behaviors in face-to-face interactions. Kiesler, Siegel, and McGuire [77] found that CMC groups took longer to reach decisions, showed more choice shift, and made more hostile, crude, or offensive comments, but also that participation in CMC groups was more equitable. They offered three possible explanations: that lack of informational feedback causes difficulty organizing; that lack of social cues leads to difficulty controlling discussion; and that depersonalization due to lack of nonverbal involvement and absence of norms led to reduced prosocial behavior.

While no specific effect of anonymity was found in these experiments, these potential explanations have become part of a popular narrative about why people behave badly online. A variety of examples emerged both in popular culture and in research literature showing how anonymity

could facilitate bad behaviors, as in the classic case of "A Rape in Cyberspace" [34] or Donath's work on antisocial behaviors in contexts lacking strong signals of identity [38]. These examples do not prove a causal link between anonymity and bad behavior, but it is certainly clear that, under certain circumstances, anonymity can lead to challenges in catching and punishing offenders by providing them with a safe space from which to launch their attacks [28, 50]

The SIDE model [121] provides a strong explanation of the impact of deindividuation on social behaviors, and the research in the previously described "Uses and consequences of anonymity" genre of current CSCW work is built in part on this model (e.g., [97]) but the finer details of the relationship between anonymity, deindividuation, and misbehavior are both unexplored and crucial to understand. Per the SIDE model [121] anonymity leads to deindividuation and deindividuation in a space with toxic norms leads to exaggerated misbehavior. However, the traditional definition of anonymity relies almost entirely on having real names or in-person visual identifiers present, and most CMC and anonymity studies have varied one or both of these characteristics as proxies for anonymity [71], but studies on platforms like YouTube and Facebook show that people can misbehave even with their real name and picture present [153]. So - what are the different types of anonymity, and how do they differently impact deindividuation?

> **H9. Forcing users to use real names will moderate the effects of deindividuation on self-categorization when users believe that connection between names and deeper identity characteristics is likely.**

We suggest that real names are only identifiers to the extent to which they *will* be used to identify users. In large threads, as in widely-viewed Facebook posts or Twitter threads, real names are present and technically *can* be connected to offline identity but rarely actually are. In contexts where the user believes that it's unlikely that their name *will* be connected to offline characteristics, real names are essentially pseudonyms for the purposes of deindividuation.

Note that another more direct connection between names and identity is gender and race/ethnicity differentiation via names. For many users online, their names can easily be used to assume a specific but not broad set of information about their identity, e.g., their gender and/or race/ethnicity. Per social identity perspectives on prejudice and stereotyping, this may lead some other users to treat them as prototypical members of those groups. Negative stereotypes may follow this categorization; it is not an uncommon experience for users to be dismissed in conversations on Twitter or Facebook because of the gender or perceived racial identity associated with their name. A user with a feminine name on Facebook might not have their name connected with their offline identity, so in this sense they are "anonymous", but other users will treat them more as a prototypical female user than either if they had only a non-gendered pseudonym or if other identity traits were clearly present.

> **H10. Misbehavior within "toxic" online spaces can be mitigated by making salient the less toxic aspects of the group's social identity.**

A broad variety of recent work in social computing has identified communities or spaces on platforms that are host to "toxic" behaviors or norms [23, 28, 47, 61]. Some approaches, e.g., platform administrators' decisions simply to remove offensive communities [24], but groups like #gamergate [104] have proven much more resistant to attempts to mitigate toxic behaviors. The Social Identity Perspective offers a number of potential approaches to adjusting a group's identity. While a group of people may be similar on a number of axes, prototypical behavior and norms are determined primarily by salient axes [137, 138, 146], so shifting salience could shift norms, behavior, and, per the Social Identity Theory of Leadership [63], bring new leaders into prominent positions (see Principle 4). For example, flooding a community that is a hub for anti-Semitism but also has many users who happen to love jazz music with music and jazz-related memes might shift salient identity characteristics more toward jazz and less toward anti-Semitism, perhaps even leading to the rise

in power of users who were experts in the former and less in the latter. While this is clearly an oversimplification, there is potential for shifting salience of identity characteristics by focusing attention on non-toxic commonalities in toxic spaces.

However, there are many spaces online that will likely be resistant to any platform or community level interventions, and thus interventions must take place on an individual level -

> **H11. Individuals in a "toxic" online spaces will be made less likely to internalize toxic norms when they become individuated.**

Several threads of research have explored different techniques for dealing with antisocial behaviors. While Friedman and Resnick [50] note that designing social systems where it is trivial for users to create new accounts leads to challenges in effective discipline of unruly users, recent research finds that mandatory enforcement of self-identification can create even more bad behavior [26]. Correspondingly, the same study found that users who voluntarily disclosed personal information were less likely to misbehave. Here it makes sense to consider: deindividuation has clearly led to misbehavior in "toxic" spaces. If the broad norms of the spaces themselves cannot be shifted, might we find better ways to shift individuals' behavior instead by re-individuating them so they become less likely to internalize toxic norms? Donath's work on Social Signaling Theory [38] offers a starting point for integrating the SIDE model; platforms that make it possible to display honest "assessment" signals related to their personal identities can help users remain or become individuated.

4.5 Leadership

Studies of leadership in CSCW have typically focused on team structures or individual behaviors that impact success. Prior work on team structures has explored the use of distributed leadership as opposed to the more traditional hierarchical leadership in online production communities [95, 127, 165], while studies on individual behaviors view leadership through a framework of behavioral styles (e.g., task-focused styles such as transactional leadership, and person-focused styles such as transformational leadership [62]) and investigate their effectiveness in online production communities [165]. However, studies scarcely address the emergence of leaders in online communities, and those that do implicitly view the process through a tenure-based framework. For example, studies on Wikipedia and other online production communities typically draw a distinction between "newcomers" and "oldtimers," and follow the assumption that those with longer tenures in the community earn the opportunity to take on more leadership roles in it 21, 27.

In contrast to the typical tenure-based frameworks of leadership that are used in CSCW research in online communities [159, 165], the social identity theory of leadership [63] instead views prototypicality as the defining characteristic in the emergence of leaders. Rather than identifying individuals with longer tenures in a community as potential leaders, the social identity theory of leadership identifies individuals whose qualities are viewed as the most prototypical within a group as potential leaders. As discussed noted in our Principle 4 section, each member of a group displays variable prototypicality in each trait that is salient to the group's identity; members of a Facebook for vegetarians may be variably hostile to factory farming practices; members of a subreddit dedicated to creation of humorous memes may be variably appreciative of dark humor. In each of these cases, the group prototype exists somewhere near the central point of each identity characteristic, and the social identity theory of leadership predicts that users who are closest to the prototype on the most axes will emerge as leaders through the process described in the Principle 4 section.

Online contexts offer a new domain for extending the social identity theory of leadership, specifically in understanding the process that shape visibility of prototypicality. For example, if an

individual on a social media platform such as Facebook, Twitter, or YouTube wants to increase their online influencer status or number of followers, then posting content (e.g., words or images expressing attitudes or behaviors) that is similar to content posted by the majority of other members within a target group can be an effective strategy, so long as it provides clear evidence of prototypicality. However, algorithms that repeatedly select for the most attention grabbing content posted by individuals on social media platforms may shift the audience's perception of what is prototypical within a community to the extreme, and subsequently surface more extremist leaders. This could be more of a factor as community size increases - it is more difficult to stand out in a Facebook group with 100,000 members than in a subreddit with 1000 subscribers, and thus users might be pushed to act in more extreme or attention-grabbing ways in order to demonstrate their prototypicality. This suggests important design implications for platform developers, as the social identities that their design decisions surface could influence the emergence of certain types of leaders and drive corresponding types of social dynamics within the user community.

> **H14. An individual's influence and leadership status in an online community can be increased by displaying or framing their qualities in a way that increases the salience of their similarity to other members.**

> **H15. Within the same group of people, the users who emerge as leaders will be those whose identity characteristics best match the characteristics that platform is designed to highlight.**

Beyond generating new hypotheses related to the emergence of leaders in online communities and the role that individuals and platform designs can play in the process, the social identity perspective also allows us to propose new mediators and moderators in existing models of leadership effects. It is important to note here that the social identity view of leadership is not mutually exclusive with other views of leadership, but can rather be used in tandem with structure-based or behavior-based frameworks to further understand the mechanisms supporting leadership processes. We argue that the social identity view of leadership can augment previous views of leadership, such as tenure-based, structure-based, and behavior-based frameworks, to generate novel hypotheses and inspire novel designs related to the emergence and influence of leaders in CSCW systems that previous views would not have suggested by themselves.

5 METHODOLOGICAL CONSIDERATIONS

Having discussed the potential for applications of the social identity perspective to expand several research domains in CSCW, we now turn our attention to its implications for research methodology. We begin with an overview of specific methods from SIP for manipulating and measuring facets of social identity and close with a set of high-level recommendations to consider when working from a social identity perspective.

Social vs. Personal identity salience and activation. One of the most fundamental tools that psychologists have developed to assess the contents of an individual's self-concept (specifically the *working* self concept, the dimensions of the self that are most salient at any particular moment) is the Twenty Statements Test [58, 105]. This open-ended probe requires participants to complete a sentence stem such as "I am _____" twenty times, with responses coded for the relevance to a number of identity-related measures, including an emphasis on personal characteristics (e.g., unique traits or abilities) or social characteristics (e.g., group memberships, relational affiliations, etc.). A related but more complex approach was taken by Smith and Henry [138], who asked college student participants to first rate themselves and a relevant social identity group (e.g., their fraternity or sorority) on 90 different personality traits (to assess characteristics shared between self and group) and, later, to make yes-no judgments about the self-descriptiveness of the same

traits. Participants' response times for those yes-no judgments reflected the degree to which shared versus unshared characteristics were more salient in participants' self-concepts. Other measurement techniques attempting to gauge the current cognitive accessibility of social identities include the use of word-completion tasks featuring stems that could be filled in with social identity-relevant words (e.g., cl*ub*, me*mber*, te*am*) or with words unrelated to social identity (e.g., cl*ot*, me*ntal*, te*nt*), as used by Knowles and Gardner [79].

In addition to measuring identity salience, social science is rife with techniques for temporarily activating a particular level of identity to assess its effects on subsequent perceptions, beliefs, or behaviors. Among the most widely used methods for "identity priming" include having participants write or read passages about a specific identity group [79]; or, more broadly, passages containing a proliferation of first-person singular ("I") or plural ("we") pronouns [18]; administering questionnaires with items pertaining to specific social identities (e.g., gender versus ethnicity: [136]; and using subtle imagery or iconography to activate a particular identity [49]. Yet another approach to increasing identity salience is to place participants in either real or imagined scenarios in which a specific group affiliation or membership is activated by factors such as numerical representation (e.g., single-gender versus mixed-gender groups: [1]). All of these approaches share a common goal of shifting the salience or accessibility of a particular social identity (or of social identities in general) and reducing the relative cognitive availability of personal-level identities.

Manipulating and assessing prototypicalty. Measures of protypicality within the SIP literature are fairly straightforward and typically utilize self-report scales assessing the perceived characteristics (e.g., traits, attitudes, motivations) of the average member of a particular identity group and one's own adherence to or fulfillment of those characteristics [73]. In addition, Jetten and colleagues [74] used a single-item measure to assess individuals' self-perceived prototypicality that can be used flexibly for any social identity group ("Overall, I perceive myself as being a typical [group]").

The concepts and measures in both prototypicality and level of identity activation have relevance in particular to the self-presentation research direction discussed above. Experiments using the methods above could be performed to study which identities are activated or whether certain identities can be activated in different situations. Does recent Facebook use impact how quickly participants adopt social identity characteristics of new in-person social groups? What is the impact of a cell phone vibrating from a notification on in-the-moment identification with a different social group? Does it remind participants of their other social identities, perhaps mitigating the deindividuating effects of anonymity?

Measuring additional dimensions of social identity. Beyond salience, accessibility, and prototypicality, there are a number of perceptual and evaluative dimensions of social identity that are extremely useful for understanding and predicting the centrality and impact of group memberships on an individual's self-perception and group-related judgments and behaviors. For example, the Collective Self-Esteem Scale [94] is a self-report instrument that includes subscales measuring the perceived goodness and worthiness of a target group from both a internal/private and external/public perspective, respondents' self-evaluations as group members, and the importance of the group to one's identity. Leach and colleagues [87] validated a multi-component model of group identification using measures of ingroup *solidarity* (e.g., "I feel a bond with [group]"); *satisfaction* (e.g., "Being [group] gives me good feeling"); *centrality* (e.g., "I often think about the fact that I am [group]"; *self-stereotyping*(e.g., "I am similar to the average [group] member"); and *ingroup homogeneity* (e.g., "[Group] members have a lot in common with one another"). The related construct of *ingroup entativity* refers to the extent to which individuals perceive that members of a particular social identity group share a common fate, have members who are similar to one another, and are part of a real, bounded entity; these group perceptions are typically measured with self-report items (e.g., "[Group] have a sense of common fate," "[Group] has real existence as a group") [22].

Measures of *social identity complexity* assess the degree to which individuals perceive greater or lesser overlap in the characteristics of members of different social identity groups that are central to their self-concept. To illustrate, one means of measuring social identity complexity requires individuals to list the five identity groups that are most important to them and, for each pair of groups, to the perceived level of overlap in membership between them (e.g., "Of persons who are computer programmers, what percentage do you think are also online gamers?") [107, 130]. All of these measures are valuable means of evaluating various dimensions of individuals' perceptions and affective responses to salient social identity groups and their members.

(de)Individuating participants. Research stemming from the SIDE Model has utilized a number of core manipulations of deindividuation in computer-mediated communication contexts, the most common being techniques intended to reduce personal identifiability, such as the preservation of visual anonymity [78] and/or uniformity of appearance between all group members [85], and increases in group size to facilitate greater immersion [36]. In early work, Reicher, varied anonymity of participants in the same physical space by cloaking them in baggy overalls and masks, but preserved social group identity by seating participants within separate groups and telling them that they would be tested as a group [121]. Consistent with the predictions of SIDE, they found that deindividuated participants showed opinions more prototypical of their identity group (in this case more pro-vivisection for scientists and anti-vivisection for social scientists). Other work has looked at the interaction between anonymity and an outgroup, per Turner et al.'s assertion that group prototypes are shifted by outgroup presence [149]. Lea and Spears [85] found experimental justification for separation of conformity and group polarization as phenomena. When placed in groups communicating at a distance via computers, individuated participants gravitated toward what they were told were common or majority opinions on certain topics, similar to conformity found by Asch [6] in his classic line-length studies. However, when participants' group identities were made salient, they gravitated away from other groups' opinions and toward their own group's dominant opinion. These effects were found to be an interaction between anonymity (as operationalized via computer-mediated-communication) and level of identity salience; in the non-anonymous (face-to-face) conditions, the activation of individual vs social identities had no impact on opinions.

Though some CSCW work has already experimentally studied anonymity [97], less work in CSCW and in social psychology has explored the broad variety of possible dimensions of anonymity and their interactions with other group principles. CMC-based experiments offer the potential to vary how present outgroups are in a given situation, which could impact group prototypes. Groups can also be shifted easily between anonymous and identified conditions in a within-subjects fashion, and they can be variably individuated or deindividuated over time.

High-level Recommendations. In addition to considering these principles and methods previously used in SIP work, we also invite members of the CSCW community to reflect more broadly on how this body of literature may be a worthwhile supplement to their current approaches to practice and empirical investigation. First, we suggest that designers consider in more depth what it means to *design for many groups* rather than individual users or even many users. Every social platform online, from the minimally-designed 4chan [10] to Facebook, with its extensively research-driven design, has developed subgroups with their own norms for behavior, and these groups inevitably come into conflict. We suggest that designers consider that new platforms will, by the very nature of social identity, become host to such conflicts, and that additional features on any platform will impact these conflicts in ways that may not immediately be obvious.

Second, following directly from the previous principle, we suggest that UX researchers consider *testing new features with identity-based groups* rather than single users or even groups of users in certain circumstances. Any developed technology from social media platforms to wearable

technologies will be eventually be used or at minimum discussed in social contexts, and thus will be evaluated by users in part based on the norms of the groups of which they are members. There exist interesting opportunities for pushing UX research in new directions by varying participants' levels of deindividuation and social vs personal identity activation. Each of these cases may be relevant to the evaluation of different types of products and systems.

Finally, as discussed in the opening of this paper, we suggest that researchers consider whether *studying and evaluating groups instead of individuals or many individuals* on social platforms might be appropriate, depending on the goals of the research. This could take a variety of forms. For example, researchers might consider interviewing users in a group rather than individually in order to understand group dynamics. A classic counterargument to this approach would suggest that this taints the ability of researchers to understand true individual motivations because group norms will bias what they say, but when the goal of the research is to understand group dynamics, these biases may be more useful to observe than the responses of users removed from the social context of the platform. Second, instead of evaluating aggregated user data from across a site, researchers might consider including users' social affiliations as primary groupings in analysis. It might even be reasonable in some cases to consider a single individual in two different social contexts as two separate individuals, as a significant portion of their identity and thus social behaviors will vary between these contexts.

6 CONCLUSION

In this paper, we argue for the potential for theory from the Social Identity Perspective to have a greater impact across a variety of domains in CSCW research. We review the limited inroads this body of theory has made so far on CSCW research; we identify core principles of the theory as relevant starting points for researchers considering this approach; we apply these principles to provide new perspectives on five different domains of CSCW research; and we consider what implications these theories have for methodology in studying online collaboration.

It is not our intention to suggest that the social identity framework should be used in all cases or even that it should be a dominant paradigm, but rather that we believe that it would benefit researchers to consider the applicability of these principles to their work and use them as theoretical and methodological lenses where appropriate. We also do not intend to suggest that examples of previous work that we described above would have been improved if they had relied on social identity instead of the theories that they drew from, but rather have attempted to suggest ways in which their results might be built upon in the future. Ultimately, we believe that a greater focus on the emergent properties of groups and group identity can provide both a valuable supplementary angle on existing lines of inquiry and inspiration for new research directions within CSCW, and we hope that we have provided here a primer as well as a starting point for such work to flourish.

REFERENCES

[1] Dominic Abrams, Joanne Thomas, and Michael A Hogg. 1990. Numerical distinctiveness, social identity and gender salience. *British Journal of Social Psychology* 29, 1 (1990), 87–92.

[2] Dominic Ed Abrams and Michael A Hogg. 1990. *Social identity theory: Constructive and critical advances.* Springer-Verlag Publishing.

[3] Mark S Ackerman. 2000. The intellectual challenge of CSCW: the gap between social requirements and technical feasibility. *Human-computer interaction* 15, 2 (2000), 179–203.

[4] Nitin Agarwal, Huan Liu, Sudheendra Murthy, Arunabha Sen, and Xufei Wang. 2009. A Social Identity Approach to Identify Familiar Strangers in a Social Network. In *ICWSM*.

[5] Judd Antin. 2011. My kind of people?: perceptions about wikipedia contributors and their motivations. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems*. ACM, 3411–3420.

[6] Solomon E Asch and H Guetzkow. 1951. Effects of group pressure upon the modification and distortion of judgments. *Groups, leadership, and men* (1951), 222–236.

[7] Blake E Ashforth and Fred Mael. 1989. Social identity theory and the organization. *Academy of management review* 14, 1 (1989), 20–39.

[8] Saeideh Bakhshi, Partha Kanuparthy, and David A Shamma. 2015. Understanding Online Reviews: Funny, Cool or Useful?. In *Proceedings of the 18th ACM Conference on Computer Supported Cooperative Work & Social Computing*. ACM, 1270–1276.

[9] Gerard Beenen, Kimberly Ling, Xiaoqing Wang, Klarissa Chang, Dan Frankowski, Paul Resnick, and Robert E Kraut. 2004. Using social psychology to motivate contributions to online communities. In *Proceedings of the 2004 ACM conference on Computer supported cooperative work*. ACM, 212–221.

[10] Michael S Bernstein, Andrés Monroy-Hernández, Drew Harry, Paul André, Katrina Panovich, and Gregory G Vargas. 2011. 4chan and /b: An Analysis of Anonymity and Ephemerality in a Large Online Community.. In *ICWSM*. 50–57.

[11] Michael Billig and Henri Tajfel. 1973. Social categorization and similarity in intergroup behaviour. *European Journal of Social Psychology* 3, 1 (1973), 27–52.

[12] Kirsten Boehner, Janet Vertesi, Phoebe Sengers, and Paul Dourish. 2007. How HCI interprets the probes. In *Proceedings of the SIGCHI conference on Human factors in computing systems*. ACM, 1077–1086.

[13] Nathan Bos, N Sadat Shami, Judith S Olson, Arik Cheshin, and Ning Nan. 2004. In-group/out-group effects in distributed teams: an experimental simulation. In *Proceedings of the 2004 ACM conference on Computer supported cooperative work*. ACM, 429–436.

[14] danah boyd. 2008. *Taken out of context: American teen sociality in networked publics.* University of California, Berkeley.

[15] Erin Bradner and Gloria Mark. 2002. Why distance matters: effects on cooperation, persuasion and deception. In *Proceedings of the 2002 ACM Conference on Computer-supported Cooperative Work*. ACM, 226–235.

[16] Marilynn B Brewer. 1991. The social self: On being the same and different at the same time. *Personality and social psychology bulletin* 17, 5 (1991), 475–482.

[17] Marilynn B Brewer. 1993. The role of distinctiveness in social identity and group behaviour. (1993).

[18] Marilynn B Brewer and Wendi Gardner. 1996. Who is this "We"? Levels of collective identity and self representations. *Journal of personality and social psychology* 71, 1 (1996), 83.

[19] Marilynn B Brewer and Cynthia L Pickett. 1999. Distinctiveness motives as a source of the social self. *The psychology of the social self* 14 (1999), 71–87.

[20] Judith M Brown, Gitte Lindgaard, and Robert Biddle. 2012. Interactional identity: designers and developers making joint work meaningful and effective. In *Proceedings of the 2012 ACM conference on Computer Supported Cooperative Work*. ACM, 1381–1390.

[21] Moira Burke and Robert Kraut. 2008. Mopping up: modeling wikipedia promotion decisions. In *Proceedings of the 2008 ACM Conference on Computer-Supported Cooperative Work*. ACM, 27–36.

[22] Emanuele Castano, Vincent Yzerbyt, and David Bourguignon. 2003. We are one and I like it: The impact of ingroup entitativity on ingroup identification. *European journal of social psychology* 33, 6 (2003), 735–754.

[23] Stevie Chancellor, Jessica Annette Pater, Trustin Clear, Eric Gilbert, and Munmun De Choudhury. 2016. # thyghgapp: Instagram content moderation and lexical variation in pro-eating disorder communities. In *Proceedings of the 2016 ACM Conference on Computer-Supported Cooperative Work*. ACM, 1201–1213.

[24] Eshwar Chandrasekharan, Umashanthi Pavalanathan, Anirudh Srinivasan, Adam Glynn, Jacob Eisenstein, and Eric Gilbert. 2017. You can't stay here: The efficacy of reddit's 2015 ban examined through hate speech. *Proceedings of the ACM on Human-Computer Interaction* 1, CSCW (2017), 31.

[25] Prerna Chikersal, Maria Tomprou, Young Ji Kim, Anita Williams Woolley, and Laura Dabbish. 2017. Deep Structures of Collaboration: Physiological Correlates of Collective Intelligence and Group Satisfaction.. In *Proceedings of the 2017 ACM Conference on Computer-Supported Cooperative Work*. 873–888.

[26] Daegon Cho and K Hazel Kwon. 2015. The impacts of identity verification and disclosure of social cues on flaming in online user comments. *Computers in Human Behavior* 51 (2015), 363–372.

[27] Boreum Choi, Kira Alexander, Robert E Kraut, and John M Levine. 2010. Socialization tactics in wikipedia and their effects. In *Proceedings of the 2010 ACM Conference on Computer-Supported Cooperative Work*. ACM, 107–116.

[28] Danielle Keats Citron. 2014. *Hate crimes in cyberspace*. Harvard University Press.

[29] Laura Dabbish, Robert Kraut, and Jordan Patton. 2012. Communication and commitment in an online game team. In *Proceedings of the SIGCHI conference on human factors in computing systems*. ACM, 879–888.

[30] Munmun De Choudhury and Sushovan De. 2014. Mental Health Discourse on reddit: Self-Disclosure, Social Support, and Anonymity. In *ICWSM*.

[31] Munmun De Choudhury, Shagun Jhaver, Benjamin Sugar, and Ingmar Weber. 2016. Social Media Participation in an Activist Movement for Racial Equality. In *ICWSM*. 92–101.

[32] Michael A DeVito, Jeremy Birnholtz, and Jeffery T Hancock. 2017. Platforms, People, and Perception: Using Affordances to Understand Self-Presentation on Social Media. In *Proceedings of the 2017 ACM Conference on Computer Supported Cooperative Work and Social Computing*. ACM, 740–754.

[33] E Ilana Diamant, Susan R Fussell, and Fen-ly Lo. 2008. Where did we turn wrong?: unpacking the effect of culture and technology on attributions of team performance. In *Proceedings of the 2008 ACM Conference on Computer-Supported Cooperative Work*. ACM, 383–392.

[34] Julian Dibbell. 1994. A rape in cyberspace or how an evil clown, a Haitian trickster spirit, two wizards, and a cast of dozens turned a database into a society. *Ann. Surv. Am. L.* (1994), 471.

[35] Michael Diehl. 1990. The minimal group paradigm: Theoretical explanations and empirical findings. *European review of social psychology* 1, 1 (1990), 263–292.

[36] Ed Diener, Rob Lusk, Darlene DeFour, and Robert Flax. 1980. Deindividuation: Effects of group size, density, number of observers, and group member similarity on self-consciousness and disinhibited behavior. *Journal of Personality and Social Psychology* 39, 3 (1980), 449.

[37] Carl DiSalvo, Phoebe Sengers, and Hrönn Brynjarsdóttir. 2010. Mapping the landscape of sustainable HCI. In *Proceedings of the SIGCHI conference on human factors in computing systems*. ACM, 1975–1984.

[38] Judith S Donath. 1999. Identity and deception in the virtual community. In *Communities in cyberspace*. Routledge, 37–68.

[39] Naomi Ellemers, Paulien Kortekaas, Jaap W Ouwerkerk, et al. 1999. Self-categorization, commitment to the group and social self-esteem as related but distinct aspects of social identity. (1999).

[40] Naomi Ellemers, Russell Spears, and Bertjan Doosje. 1997. Sticking together or falling apart: In-group identification as a psychological determinant of group commitment versus individual mobility. *Journal of personality and social psychology* 72, 3 (1997), 617.

[41] Naomi Ellemers, Russell Spears, and Bertjan Doosje. 2002. Self and social identity. *Annual review of psychology* 53, 1 (2002), 161–186.

[42] Jason B Ellis, Kurt Luther, Katherine Bessiere, and Wendy A Kellogg. 2008. Games for virtual team building. In *Proceedings of the 7th ACM Conference on Designing Interactive Systems*. ACM, 295–304.

[43] Shelly D Farnham and Elizabeth F Churchill. 2011. Faceted identity, faceted lives: social and technical issues with being yourself online. In *Proceedings of the ACM 2011 conference on Computer supported cooperative work*. ACM, 359–368.

[44] Rosta Farzan, Laura A Dabbish, Robert E Kraut, and Tom Postmes. 2011. Increasing commitment to online communities by designing for social presence. In *Proceedings of the 2011 ACM Conference on Computer-Supported Cooperative Work*. ACM, 321–330.

[45] Leon Festinger. 1954. A theory of social comparison processes. *Human relations* 7, 2 (1954), 117–140.

[46] Anna Filippova and Hichang Cho. 2016. The effects and antecedents of conflict in free and open source software development. In *Proceedings of the 19th ACM Conference on Computer-Supported Cooperative Work & Social Computing*. ACM, 705–716.

[47] Claudia Flores-Saviaga, Brian C Keegan, and Saiph Savage. 2018. Mobilizing the Trump Train: Understanding Collective Action in a Political Trolling Community. *ICWSM* (2018).

[48] Eureka Foong, Steven P Dow, Brian P Bailey, and Elizabeth M Gerber. 2017. Online feedback exchange: A framework for understanding the socio-psychological factors. In *Proceedings of the 2017 CHI Conference on Human Factors in Computing Systems*. ACM, 4454–4467.

[49] Mark R Forehand, Rohit Deshpandé, II Reed, et al. 2002. Identity salience and the influence of differential activation of the social self-schema on advertising response. *Journal of Applied psychology* 87, 6 (2002), 1086.

[50] Eric J Friedman and Paul Resnick. 2001. The social cost of cheap pseudonyms. *Journal of Economics & Management Strategy* 10, 2 (2001), 173–199.

[51] Erving Goffman. 1959. The Presentation of Self in Everyday Life. *Butler, Bodies that Matter* (1959).

[52] Sean P Goggins, Krista Galyen, and James Laffey. 2010. Network analysis of trace data for the support of group work: activity patterns in a completely online course. In *Proceedings of the 2010 ACM International Conference on Supporting Group Work*. ACM, 107–116.

[53] Sean P Goggins, James Laffey, I Tsai, et al. 2007. Cooperation and groupness: Community formation in small online collaborative groups. In *Proceedings of the 2007 International ACM Conference on Supporting Group Work*. ACM, 207–216.

[54] Gopakumar M Gopalakrishnan, Daniel S Halgin, and Stephen P Borgatti. 2013. Voluntary turnover in a distributed work setting: an examination of the role of spatial propinquity and role similarity in project affiliation networks. In *Proceedings of the 2013 conference on Computer supported cooperative work*. ACM, 329–340.

[55] Nathan Hahn, Joseph Chang, Ji Eun Kim, and Aniket Kittur. 2016. The knowledge accelerator: Big picture thinking in small pieces. In *Proceedings of the 2016 CHI Conference on Human Factors in Computing Systems*. ACM, 2258–2270.

[56] Oliver L Haimson, Jed R Brubaker, Lynn Dombrowski, and Gillian R Hayes. 2016. Digital footprints and changing networks during online identity transitions. In *Proceedings of the 2016 CHI Conference on Human Factors in Computing Systems*. ACM, 2895–2907.

[57] D Fox Harrell. 2009. Computational and cognitive infrastructures of stigma: Empowering identity in social computing and gaming. In *Proceedings of the seventh ACM conference on Creativity and cognition*. ACM, 49–58.

[58] Wynona S Hartley. 1970. *Manual for the twenty-statements problem (who am I?)*. Department of Research, Greater Kansas City Mental Health Foundation.

[59] Pamela J Hinds and Diane E Bailey. 2003. Out of sight, out of sync: Understanding conflict in distributed teams. *Organization science* 14, 6 (2003), 615–632.

[60] Pamela J Hinds and Mark Mortensen. 2005. Understanding conflict in geographically distributed teams: The moderating effects of shared identity, shared context, and spontaneous communication. *Organization science* 16, 3 (2005), 290–307.

[61] Gabriel Emile Hine, Jeremiah Onaolapo, Emiliano De Cristofaro, Nicolas Kourtellis, Ilias Leontiadis, Riginos Samaras, Gianluca Stringhini, and Jeremy Blackburn. 2017. Kek, cucks, and god emperor trump: A measurement study of 4chan's politically incorrect forum and its effects on the web. *ICWSM* (2017).

[62] Julia E Hoch and Steve WJ Kozlowski. 2014. Leading virtual teams: Hierarchical leadership, structural supports, and shared team leadership. *Journal of applied psychology* 99, 3 (2014), 390.

[63] Michael A Hogg. 2001. A social identity theory of leadership. *Personality and social psychology review* 5, 3 (2001), 184–200.

[64] Michael A Hogg and Elizabeth A Hardie. 1991. Social Attraction, Personal Attraction, and Self-Categorization-, A Field Study. *Personality and Social Psychology Bulletin* 17, 2 (1991), 175–180.

[65] Michael A Hogg and Scott A Reid. 2006. Social identity, self-categorization, and the communication of group norms. *Communication theory* 16, 1 (2006), 7–30.

[66] Michael A Hogg and Deborah I Terry. 2000. Social identity and self-categorization processes in organizational contexts. *Academy of management review* 25, 1 (2000), 121–140.

[67] Michael A Hogg, John C Turner, and Barbara Davidson. 1990. Polarized norms and social frames of reference: A test of the self-categorization theory of group polarization. *Basic and Applied Social Psychology* 11, 1 (1990), 77–100.

[68] Hwajung Hong, Eric Gilbert, Gregory D Abowd, and Rosa I Arriaga. 2015. In-group questions and out-group answers: crowdsourcing daily living advice for individuals with autism. In *Proceedings of the 33rd Annual ACM Conference on Human Factors in Computing Systems*. ACM, 777–786.

[69] Matthew J Hornsey. 2008. Social identity theory and self-categorization theory: A historical review. *Social and Personality Psychology Compass* 2, 1 (2008), 204–222.

[70] Gary Hsieh, Youyang Hou, Ian Chen, and Khai N Truong. 2013. Welcome!: social and psychological predictors of volunteer socializers in online communities. In *Proceedings of the 2013 conference on Computer supported cooperative work*. ACM, 827–838.

[71] Guanxiong Huang and Kang Li. 2016. The effect of anonymity on conformity to group norms in online contexts: A meta-analysis. *International journal of communication* 10 (2016), 18.

[72] Jessica Hullman, Eytan Adar, and Priti Shah. 2011. The impact of social information on visual judgments. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems*. ACM, 1461–1470.

[73] Jolanda Jetten, Russell Spears, and Antony SR Manstead. 1996. Intergroup norms and intergroup discrimination: Distinctive self-categorization and social identity effects. *Journal of personality and social psychology* 71, 6 (1996), 1222.

[74] Jolanda Jetten, Russell Spears, and Antony SR Manstead. 1997. Distinctiveness threat and prototypicality: Combined effects on intergroup discrimination and collective self-esteem. *European Journal of Social Psychology* 27, 6 (1997), 635–657.

[75] Kenneth Joseph, Wei Wei, and Kathleen M Carley. 2017. Girls Rule, Boys Drool: Extracting Semantic and Affective Stereotypes from Twitter.. In *CSCW*. 1362–1374.

[76] Aimée A Kane, Sara Kiesler, and Ruogu Kang. 2018. Inaccuracy Blindness in Collaboration Persists, even with an Evaluation Prompt. In *Proceedings of the 2018 CHI Conference on Human Factors in Computing Systems*. ACM, 494.

[77] Sara Kiesler, Jane Siegel, and Timothy W McGuire. 1984. Social psychological aspects of computer-mediated communication. *American psychologist* 39, 10 (1984), 1123.

[78] Junghyun Kim and Hee Sun Park. 2011. The effect of uniform virtual appearance on conformity intention: Social identity model of deindividuation effects and optimal distinctiveness theory. *Computers in Human Behavior* 27, 3 (2011), 1223–1230.

[79] Megan L Knowles and Wendi L Gardner. 2008. Benefits of membership: The activation and amplification of group identities in response to social rejection. *Personality and Social Psychology Bulletin* 34, 9 (2008), 1200–1213.

[80] Karel Kreijns, Paul A Kirschner, and Wim Jochems. 2003. Identifying the pitfalls for social interaction in computer-supported collaborative learning environments: a review of the research. *Computers in human behavior* 19, 3 (2003), 335–353.

[81] Haewoon Kwak, Jeremy Blackburn, and Seungyeop Han. 2015. Exploring cyberbullying and other toxic behavior in team competition online games. In *Proceedings of the 33rd Annual ACM Conference on Human Factors in Computing Systems*. ACM, 3739–3748.

[82] Cliff Lampe, Rick Wash, Alcides Velasquez, and Elif Ozkaya. 2010. Motivations to participate in online communities. In *Proceedings of the SIGCHI conference on Human factors in computing systems*. ACM, 1927–1936.

[83] Airi Lampinen, Vilma Lehtinen, Coye Cheshire, and Emmi Suhonen. 2013. Indebtedness and reciprocity in local online exchange. In *Proceedings of the 2013 conference on Computer supported cooperative work*. ACM, 661–672.

[84] Airi Lampinen, Sakari Tamminen, and Antti Oulasvirta. 2009. All my people right here, right now: Management of group co-presence on a social networking site. In *Proceedings of the ACM 2009 international conference on Supporting group work*. ACM, 281–290.

[85] Martin Lea and Russell Spears. 1991. Computer-mediated communication, de-individuation and group decision-making. *International journal of man-machine studies* 34, 2 (1991), 283–301.

[86] Colin Wayne Leach, Naomi Ellemers, and Manuela Barreto. 2007. Group virtue: the importance of morality (vs. competence and sociability) in the positive evaluation of in-groups. *Journal of personality and social psychology* 93, 2 (2007), 234.

[87] Colin Wayne Leach, Martijn Van Zomeren, Sven Zebel, Michael LW Vliek, Sjoerd F Pennekamp, Bertjan Doosje, Jaap W Ouwerkerk, and Russell Spears. 2008. Group-level self-definition and self-investment: a hierarchical (multicomponent) model of in-group identification. *Journal of personality and social psychology* 95, 1 (2008), 144.

[88] Alex Leavitt. 2015. This is a throwaway account: Temporary technical identities and perceptions of anonymity in a massive online community. In *Proceedings of the 18th ACM Conference on Computer Supported Cooperative Work & Social Computing*. ACM, 317–327.

[89] Gilly Leshed and Poppy Lauretta McLeod. 2012. Metaphors for social relationships in 3d virtual worlds. In *Proceedings of the ACM 2012 conference on Computer Supported Cooperative Work*. ACM, 593–602.

[90] Eden Litt. 2012. Knock, knock. Who's there? The imagined audience. *Journal of Broadcasting & Electronic Media* 56, 3 (2012), 330–345.

[91] Fannie Liu, Denae Ford, Chris Parnin, and Laura Dabbish. 2018. Selfies as Social Movements: Influences on Participation and Perceived Impact on Stereotypes. *Proceedings of the ACM on Human-Computer Interaction* 1, CSCW (2018).

[92] Peng Liu, Xianghua Ding, and Ning Gu. 2016. "Helping Others Makes Me Happy": Social Interaction and Integration of People with Disabilities. In *Proceedings of the 19th ACM Conference on Computer-Supported Cooperative Work & Social Computing*. ACM, 1596–1608.

[93] Ian J Livingston, Carl Gutwin, Regan L Mandryk, and Max Birk. 2014. How players value their characters in world of warcraft. In *Proceedings of the 17th ACM conference on Computer supported cooperative work & social computing*. ACM, 1333–1343.

[94] Riia Luhtanen and Jennifer Crocker. 1992. A collective self-esteem scale: Self-evaluation of one's social identity. *Personality and social psychology bulletin* 18, 3 (1992), 302–318.

[95] Kurt Luther, Casey Fiesler, and Amy Bruckman. 2013. Redistributing leadership in online creative collaboration. In *Proceedings of the 2013 Conference on Computer-Supported Cooperative Work*. ACM, 1007–1022.

[96] Xiaojuan Ma and Nan Cao. 2017. Video-based Evanescent, Anonymous, Asynchronous Social Interaction: Motivation and Adaption to Medium. In *Proceedings of the 2017 ACM Conference on Computer Supported Cooperative Work and Social Computing*. ACM, 770–782.

[97] Xiao Ma, Jeff Hancock, and Mor Naaman. 2016. Anonymity, intimacy and self-disclosure in social media. In *Proceedings of the 2016 CHI Conference on Human Factors in Computing Systems*. ACM, 3857–3869.

[98] Danaja Maldeniya, Arun Varghese, Toby E Stuart, and Daniel M Romero. 2017. The Role of Optimal Distinctiveness and Homophily in Online Dating.. In *ICWSM*. 616–619.

[99]   Elizabethc A Mannix, Terri Griffith, and Magaret A Neale. 2002. The phenomenology of conflict in distributed work teams. *Distributed work* 2002 (2002), 213–233.

[100] Drew Margolin, Wang Liao, and Yu-Ru Lin. 2015. Conversing in Reflective Glory: A Systematic Study Using National Football League Games.. In *ICWSM*. 646–649.

[101] Gloria Mark, Mossaab Bagdouri, Leysia Palen, James Martin, Ban Al-Ani, and Kenneth Anderson. 2012. Blogs as a collective war diary. In *Proceedings of the ACM 2012 conference on Computer Supported Cooperative Work*. ACM, 37–46.

[102] José M Marques, Vincent Y Yzerbyt, and Jacques-Philippe Leyens. 1988. The âĂIJblack sheep effectâĂİ: Extremity of judgments towards ingroup members as a function of group identification. *European Journal of Social Psychology* 18, 1 (1988), 1–16.

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

[104] Adrienne Massanari. 2017. # Gamergate and The Fappening: How RedditâĂŹs algorithm, governance, and culture support toxic technocultures. *New Media & Society* 19, 3 (2017), 329–346.

[105] Thomas S McPartland, John H Cumming, and Wynona S Garretson. 1961. Self-conception and ward behavior in two psychiatric hospitals. *Sociometry* 24, 2 (1961), 111–124.

[106] Yelena Mejova, Venkata Rama Kiran Garimella, Ingmar Weber, and Michael C Dougal. 2014. Giving is caring: understanding donation behavior through email. In *Proceedings of the 17th ACM conference on Computer supported cooperative work & social computing*. ACM, 1297–1307.

[107] Kevin P Miller, Marilynn B Brewer, and Nathan L Arbuckle. 2009. Social identity complexity: Its correlates and antecedents. *Group Processes & Intergroup Relations* 12, 1 (2009), 79–94.

[108] Jun-Ki Min, Jason Wiese, Jason I Hong, and John Zimmerman. 2013. Mining smartphone data to classify life-facets of social relationships. In *Proceedings of the 2013 conference on Computer supported cooperative work*. ACM, 285–294.

[109] Tanushree Mitra and Eric Gilbert. 2014. The language that gets people to give: Phrases that predict success on kickstarter. In *Proceedings of the 17th ACM conference on Computer supported cooperative work & social computing*. ACM, 49–61.

[110] Linda D Molm, Jessica L Collett, and David R Schaefer. 2007. Building solidarity through generalized exchange: A theory of reciprocity. *Amer. J. Sociology* 113, 1 (2007), 205–242.

[111] Michael Muller, Werner Geyer, Todd Soule, and John Wafer. 2014. Geographical and organizational distances in enterprise crowdfunding. In *Proceedings of the 17th ACM Conference on Computer-Supported Cooperative Work*. ACM, 778–789.

[112] Oded Nov, Ofer Arazy, Kelly Lotts, and Thomas Naberhaus. 2013. Motivation-targeted personalized UI design: a novel approach to enhancing citizen science participation. In *ECSCW 2013: Proceedings of the 13th European Conference on Computer Supported Cooperative Work, 21-25 September 2013, Paphos, Cyprus*. Springer, 287–297.

[113] Kenton O'Hara, Tim Kindberg, Maxine Glancy, Luciana Baptista, Byju Sukumaran, Gil Kahana, and Julie Rowbotham. 2007. Social practices in location-based collecting. In *Proceedings of the SIGCHI conference on Human factors in computing systems*. ACM, 1225–1234.

[114] Rina S Onorato and John C Turner. 2004. Fluidity in the self-concept: the shift from personal to social identity. *European Journal of Social Psychology* 34, 3 (2004), 257–278.

[115] Carolyn E Pang, Carman Neustaedter, Bernhard E Riecke, Erick Oduor, and Serena Hillman. 2013. Technology preferences and routines for sharing health information during the treatment of a chronic illness. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems*. ACM, 1759–1768.

[116] Bernd Pape, Leonard Reinecke, Markus Rohde, and Monique Strauss. 2003. E-community-building in WiInf-Central. In *Proceedings of the 2003 international ACM SIGGROUP conference on Supporting group work*. ACM, 11–20.

[117] Cale J Passmore, Max V Birk, and Regan L Mandryk. 2018. The Privilege of Immersion: Racial and Ethnic Experiences, Perceptions, and Beliefs in Digital Gaming. In *Proceedings of the 2018 CHI Conference on Human Factors in Computing Systems*. ACM, 383.

[118] Tom Postmes, Russell Spears, and Martin Lea. 1998. Breaching or building social boundaries? SIDE-effects of computer-mediated communication. *Communication research* 25, 6 (1998), 689–715.

[119] Tom Postmes, Russell Spears, Khaled Sakhel, and Daphne De Groot. 2001. Social influence in computer-mediated communication: The effects of anonymity on group behavior. *Personality and Social Psychology Bulletin* 27, 10 (2001), 1243–1254.

[120] Hemant Purohit, Yiye Ruan, David Fuhry, Srinivasan Parthasarathy, and Amit P Sheth. 2014. On Understanding the Divergence of Online Social Group Discussion. *ICWSM* 14 (2014), 396–405.

[121] Stephen D Reicher, Russell Spears, and Tom Postmes. 1995. A social identity model of deindividuation phenomena. *European review of social psychology* 6, 1 (1995), 161–198.

[122] Yuqing Ren, F Maxwell Harper, Sara Drenner, Loren Terveen, Sara Kiesler, John Riedl, and Robert E Kraut. 2010. Increasing commitment to online communities: Designing from theory. *University of Minnesota, Minneapolis, MN* (2010).

[123] Yuqing Ren, Robert Kraut, and Sara Kiesler. 2007. Applying common identity and bond theory to design of online communities. *Organization studies* 28, 3 (2007), 377–408.

[124] Daniela Retelny, Sébastien Robaszkiewicz, Alexandra To, Walter S Lasecki, Jay Patel, Negar Rahmati, Tulsee Doshi, Melissa Valentine, and Michael S Bernstein. 2014. Expert crowdsourcing with flash teams. In *Proceedings of the 27th annual ACM symposium on User interface software and technology*. ACM, 75–85.

[125] Eugenia Ha Rim Rho, Oliver L Haimson, Nazanin Andalibi, Melissa Mazmanian, and Gillian R Hayes. 2017. Class Confessions: Restorative Properties in Online Experiences of Socioeconomic Stigma. In *Proceedings of the 2017 CHI Conference on Human Factors in Computing Systems*. ACM, 3377–3389.

[126] Stephen Ricken, Sukeshini Grandhi, Doug Zytko, Starr Roxanne Hiltz, and Quentin Jones. 2014. Anyone for Bowling?: Coalescing for Shared Activities. In *Proceedings of the 18th International Conference on Supporting Group Work*. ACM, 122–130.

[127] Lionel P Robert. 2013. A multi-level analysis of the impact of shared leadership in diverse virtual teams. In *Proceedings of the 2013 conference on Computer supported cooperative work*. ACM, 363–374.

[128] Lionel P Robert. 2016. Far but near or near but far?: The effects of perceived distance on the relationship between geographic dispersion and perceived diversity. In *Proceedings of the 2016 CHI Conference on Human Factors in Computing Systems*. ACM, 2461–2473.

[129] Lionel P Robert Jr and Sangseok You. 2018. Disaggregating the Impacts of Virtuality on Team Identification. In *Proceedings of the 2018 ACM Conference on Supporting Groupwork*. ACM, 309–321.

[130] Sonia Roccas and Marilynn B Brewer. 2002. Social identity complexity. *Personality and Social Psychology Review* 6, 2 (2002), 88–106.

[131] Paul Rogers and Martin Lea. 2005. Social presence in distributed group environments: The role of social identity. *Behaviour & Information Technology* 24, 2 (2005), 151–158.

[132] Kai Sassenberg. 2002. Common bond and common identity groups on the Internet: Attachment and normative behavior in on-topic and off-topic chats. *Group Dynamics: Theory, Research, and Practice* 6, 1 (2002), 27.

[133] Sarita Schoenebeck, Nicole B Ellison, Lindsay Blackwell, Joseph B Bayer, and Emily B Falk. 2016. Playful backstalking and serious impression management: How young adults reflect on their past identities on Facebook. In *Proceedings of the 19th ACM conference on computer-supported cooperative work & social computing*. ACM, 1475–1487.

[134] Joseph Seering, Robert Kraut, and Laura Dabbish. 2017. Shaping pro and anti-social behavior on twitch through moderation and example-setting. In *Proceedings of the 2017 ACM Conference on Computer Supported Cooperative Work and Social Computing*. ACM, 111–125.

[135] Burr Settles and Steven Dow. 2013. Let's get together: the formation and success of online creative collaborations. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems*. ACM, 2009–2018.

[136] Margaret Shih, Todd L Pittinsky, and Nalini Ambady. 1999. Stereotype susceptibility: Identity salience and shifts in quantitative performance. *Psychological science* 10, 1 (1999), 80–83.

[137] Bernd Simon, Giuseppe Pantaleo, and Amelie Mummendey. 1995. Unique individual or interchangeable group member? The accentuation of intragroup differences versus similarities as an indicator of the individual self versus the collective self. *Journal of Personality and Social Psychology* 69, 1 (1995), 106.

[138] Eliot R Smith and Susan Henry. 1996. An in-group becomes part of the self: Response time evidence. *Personality and Social Psychology Bulletin* 22, 6 (1996), 635–642.

[139] Leog Stewart, Ahmer Arif, A Conrad Nied, Emma S Spiro, and Kate Starbird. 2018. Drawing the Lines of Contention: Networked Frame Contests Within# BlackLivesMatter Discourse. *Proceedings of the ACM on Human-Computer Interaction* 1, CSCW (2018).

[140] Henri Tajfel. 1974. Social identity and intergroup behaviour. *Information (International Social Science Council)* 13, 2 (1974), 65–93.

[141] Henri Tajfel. 1982. *Social identity and intergroup relations*. Cambridge University Press.

[142] Henri Tajfel. 1982. Social psychology of intergroup relations. *Annual review of psychology* 33, 1 (1982), 1–39.

[143] Henri Tajfel and John C Turner. 1979. An integrative theory of intergroup conflict. *The social psychology of intergroup relations* 33, 47 (1979), 74.

[144] H. Tajfel and J. C. Turner. 1986. The Social Identity Theory of Intergroup Behavior. In *Key readings in social psychology*, J. T. Jost and J. Sidanius (Eds.). Psychology Press, 276–293.

[145] Yla R Tausczik, Laura A Dabbish, and Robert E Kraut. 2014. Building loyalty to online communities through bond and identity-based attachment to sub-groups. In *Proceedings of the 2014 ACM conference on Computer-Supported Cooperative Work*. ACM, 146–157.

[146] David Trafimow, Harry C Triandis, and Sharon G Goto. 1991. Some tests of the distinction between the private self and the collective self. *Journal of personality and social psychology* 60, 5 (1991), 649.

[147] Michail Tsikerdekis. 2013. The effects of perceived anonymity and anonymity states on conformity and groupthink in online communities: AW ikipedia study. *Journal of the American Society for Information Science and Technology* 64, 5 (2013), 1001–1015.

[148] John C Turner. 1999. Some current issues in research on social identity and self-categorization theories. *Social identity: Context, commitment, content* 3, 1 (1999), 6–34.

[149] John C Turner, Michael A Hogg, Penelope J Oakes, Stephen D Reicher, and Margaret S Wetherell. 1987. *Rediscovering the social group: A self-categorization theory.* Basil Blackwell.

[150] John C Turner, Penelope J Oakes, S Alexander Haslam, and Craig McGarty. 1994. Self and collective: Cognition and social context. *Personality and social psychology bulletin* 20, 5 (1994), 454–463.

[151] Melissa A Valentine, Daniela Retelny, Alexandra To, Negar Rahmati, Tulsee Doshi, and Michael S Bernstein. 2017. Flash Organizations: Crowdsourcing Complex Work by Structuring Crowds As Organizations. In *Proceedings of the 2017 CHI Conference on Human Factors in Computing Systems.* ACM, 3523–3537.

[152] Bogdan Vasilescu, Daryl Posnett, Baishakhi Ray, Mark GJ van den Brand, Alexander Serebrenik, Premkumar Devanbu, and Vladimir Filkov. 2015. Gender and tenure diversity in GitHub teams. In *Proceedings of the 33rd Annual ACM Conference on Human Factors in Computing Systems.* ACM, 3789–3798.

[153] Jessica Vitak, Kalyani Chadha, Linda Steiner, and Zahra Ashktorab. 2017. Identifying Women's Experiences With and Strategies for Mitigating Negative Effects of Online Harassment. In *Proceedings of the 2017 ACM Conference on Computer Supported Cooperative Work and Social Computing.* ACM, 1231–1245.

[154] Amy Voida, Nathan Bos, Judith Olson, Gary Olson, and Lauren Dunning. 2012. Cross-cutting faultlines of location and shared identity in the intergroup cooperation of partially distributed groups. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems.* ACM, 3101–3110.

[155] Amy Voida, Sheelagh Carpendale, and Saul Greenberg. 2010. The individual and the group in console gaming. In *Proceedings of the 2010 ACM conference on Computer supported cooperative work.* ACM, 371–380.

[156] Amy Voida, Judith S Olson, and Gary M Olson. 2013. Turbulence in the clouds: challenges of cloud-based information work. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems.* ACM, 2273–2282.

[157] Yi-Chia Wang, Robert E Kraut, and John M Levine. 2015. Eliciting and receiving online support: using computer-aided content analysis to examine the dynamics of online social support. *Journal of medical Internet research* 17, 4 (2015).

[158] Suzanne Weisband, Sherry Schneider, and Terry Connolly. 1993. Participation equality and influence: Cues and status in computer-supported cooperative work groups. In *Proceedings of the Third European Conference on Computer-Supported Cooperative Work 13–17 September 1993, Milan, Italy ECSCWâĂŹ93.* Springer, 265–279.

[159] Diyi Yang, Robert Kraut, and John M Levine. 2017. Commitment of Newcomers and Old-timers to Online Health Support Communities. In *Proceedings of the 2017 CHI Conference on Human Factors in Computing Systems.* ACM, 6363–6375.

[160] Diyi Yang and Robert E Kraut. 2017. Persuading teammates to give: Systematic versus heuristic cues for soliciting loans. *Proceedings of the ACM on Human-Computer Interaction* 1 (2017), 114.

[161] Diyi Yang, Zheng Yao, and Robert E Kraut. 2017. Self-Disclosure and Channel Difference in Online Health Support Groups.. In *ICWSM.* 704–707.

[162] Sarita Yardi and danah boyd. 2010. Dynamic debates: An analysis of group polarization over time on twitter. *Bulletin of Science, Technology & Society* 30, 5 (2010), 316–327.

[163] Bowen Yu, Yuqing Ren, Loren Terveen, and Haiyi Zhu. 2017. Predicting member productivity and withdrawal from pre-joining attachments in online production groups. In *2017 ACM Conference on Computer Supported Cooperative Work and Social Computing, CSCW 2017.* Association for Computing Machinery.

[164] Lixiu Yu, Aniket Kittur, and Robert E Kraut. 2014. Distributed analogical idea generation: inventing with crowds. In *Proceedings of the 32nd annual ACM conference on Human factors in computing systems.* ACM, 1245–1254.

[165] Haiyi Zhu, Robert Kraut, and Aniket Kittur. 2012. Effectiveness of shared leadership in online communities. In *Proceedings of the ACM 2012 conference on Computer Supported Cooperative Work.* ACM, 407–416.

[166] Haiyi Zhu, Robert Kraut, and Aniket Kittur. 2012. Organizing without formal organization: group identification, goal setting and social modeling in directing online production. In *Proceedings of the ACM 2012 Conference on Computer-Supported Cooperative Work.* ACM, 935–944.

[167] Philip G Zimbardo. 1973. On the ethics of intervention in human psychological research: With special reference to the Stanford prison experiment. *Cognition* (1973).

A APPENDIX: WORK IN CSCW CITING MAJOR RESEARCH IN SIP

Table 4. Papers citing Social Identity from the ACM CHI conference

Authors	Date	Title	Major Work Cited
O'Hara, K. et al.	2007	Social practices in location-based collecting[113]	Tajfel (1982b)
Lampe, C. et al.	2010	Motivations to participate in online communities[82]	Tajfel (1974)
Antin, J.	2011	My kind of people? perceptions about Wikipedia contributors and their motivations[5]	Tajfel and Turner (1974)
Hullman, J., Adar, E., and Shah, P	2011	The impact of social information on visual judgments[72]	Reicher, Spears, and Postmes (1995)
Dabbish, L., Kraut, R., Patton, J.	2012	Communication and commitment in an online game team[29]	Hogg (2001)
Voida, A. et al.	2012	Cross-cutting faultlines of location and shared identity in the intergroup cooperation of partially distributed groups[154]	Tajfel (1982b), Brewer and Gardner (1996)
Settles, B., and Dow, S.	2013	Let's get together: the formation and success of online creative collaborations[135]	Tajfel (1982a)
Voida, A., Olson, J., and Olson, G. M.	2013	Turbulence in the clouds: challenges of cloud-based information work[156]	Brewer and Gardner (1996)
Hong, H. et al.	2015	In-group questions and out-group answers: crowdsourcing daily living advice for individuals with autism[68]	Tajfel (1982b)
Kwak, H., Blackburn, J., and Han, S.	2015	Exploring cyberbullying and other toxic behavior in team competition online games[81]	Reicher, Spears, and Postmes (1995)
Vasilescu, B. et al.	2015	Gender and tenure diversity in GitHub teams[152]	Tajfel (1982b)
Ma, X., Hancock, J., and Naaman, M.	2016	Anonymity, intimacy and self-disclosure in social media[97]	Reicher, Spears, and Postmes (1995)
Robert, L. P.	2016	Far but near or near but far?: The effects of perceived distance on the relationship between geographic dispersion and perceived diversity[128]	Tajfel and Turner (1974)
Foong, E. et al.	2017	Online feedback exchange: A framework for understanding the socio-psychological factors[48]	Reicher, Spears, and Postmes (1995)
Rho, E. H. R. et al.	2017	Class Confessions: Restorative Properties in Online Experiences of Socioeconomic Stigma[125]	Reicher, Spears, and Postmes (1995)

Yang, D., and Kraut, R. E.	2017	Persuading teammates to give: Systematic versus heuristic cues for soliciting loans[160]	Tajfel (1982b), Ellemers, Spears, and Doosje (2002)
Kane, A. A., Kiesler, S., and Kang, R.	2018	Inaccuracy Blindness in Collaboration Persists, even with an Evaluation Prompt[76]	Tajfel and Turner (1974)
Passmore, C. J., Birk, M. V., and Mandryk, R. L.	2018	The Privilege of Immersion: Racial and Ethnic Experiences, Perceptions, and Beliefs in Digital Gaming[117]	Tajfel (1974), Tajfel (1982a)

Table 5. Papers citing Social Identity from the ACM CSCW conference

Authors	Date	Title	Major Work Cited
Bradner, E., and Mark, G.	2002	Why distance matters: effects on cooperation, persuasion and deception[15]	Tajfel (1982b)
Beenen, G. et al.	2004	Using social psychology to motivate contributions to online communities[9]	Tajfel (1974), Tajfel and Turner (1974)
Bos, N. et al.	2004	In-group/out-group effects in distributed teams: an experimental simulation[13]	Tajfel (1982b)
Diamant, E. I., Fussell, S. R., and Lo, F. L.	2008	Where did we turn wrong?: unpacking the effect of culture and technology on attributions of team performance[33]	Tajfel (1974)
Voida, A., Carpendale, S., and Greenberg, S.	2010	The individual and the group in console gaming[155]	Tajfel (1974)
Farnham, S. D., and Churchill, E. F.	2011	Faceted identity, faceted lives: social and technical issues with being yourself online[43]	Tajfel (1982b)
Brown, J. M., Lindgaard, G., and Biddle, R.	2012	Interactional identity: designers and developers making joint work meaningful and effective[20]	Tajfel (1974)
Leshed, G., and McLeod, P. L.	2012	Metaphors for social relationships in 3d virtual worlds[89]	Tajfel (1982b)
Mark, G. et al.	2012	Blogs as a collective war diary[101]	Brewer and Gardner (1996)
Zhu, H., Kraut, R. E., and Kittur, A.	2012	Organizing without formal organization: group identification, goal setting and social modeling in directing online production[166]	Tajfel and Turner (1974), Hogg and Terry (2000)
Gopalakrishnan, G. M., Halgin, D. S., and Borgatti, S. P.	2013	Voluntary turnover in a distributed work setting: an examination of the role of spatial propinquity and role similarity in project affiliation networks[54]	Tajfel (1974), Turner et al. (1987)

Hsieh, G. et al.	2013	Welcome!: social and psychological predictors of volunteer socializers in online communities[70]	Tajfel (1974), Ellemers, Kortekaas, and Ouwerkerk (1999)
Min, J. K. et al.	2013	Mining smartphone data to classify life-facets of social relationships[108]	Tajfel (1982b)
Robert, L. P.	2013	A multi-level analysis of the impact of shared leadership in diverse virtual teams[127]	Tajfel (1974)
Livingston, I. J. et al.	2014	How players value their characters in world of warcraft[93]	Tajfel and Turner (1974)
Mejova, Y. et al.	2014	Giving is caring: understanding donation behavior through email[106]	Tajfel and Turner (1974)
Mitra, T., and Gilbert, E.	2014	The language that gets people to give: Phrases that predict success on kickstarterd[109]	Tajfel and Turner (1974), Tajfel (1982b)
Muller, M. et al.	2014	Geographical and organizational distances in enterprise crowdfunding[111]	Tajfel and Turner (1974), Turner et al. (1987)
Bakhshi, S., Kanuparthy, P., and Shamma, D. A.	2015	Understanding Online Reviews: Funny, Cool or Useful? [8]	Ellemers, Kortekaas, and Ouwerkerk (1999)
Leavitt, A.	2016	This is a throwaway account: Temporary technical identities and perceptions of anonymity in a massive online community[88]	Reicher, Spears, and Postmes (1995)
Filippova, A., and Cho, H.	2016	The effects and antecedents of conflict in free and open source software development[46]	Tajfel (1982b), Turner et al. (1987), Reicher, Spears, and Postmes (1995)
Chikersal, P. et al.	2017	Deep Structures of Collaboration: Physiological Correlates of Collective Intelligence and Group Satisfaction[25]	Tajfel (1974)
Ma, X., and Cao, N.	2017	Video-based Evanescent, Anonymous, Asynchronous Social Interaction: Motivation and Adaption to Medium[96]	Reicher, Spears, and Postmes (1995)
Seering, J., Kraut, R. E., and Dabbish, L.	2017	Shaping pro and anti-social behavior on twitch through moderation and example-setting[134]	Hogg (2001)
Yu, B. et al.	2017	Predicting Member Productivity and Withdrawal from Pre-Joining Attachments in Online Production Groups[163]	Tajfel and Turner (1986), Turner et al. (1987)
Liu, F. et al.	2018	Selfies as social movements: Influences on participation and perceived impact on stereotypes[91]	Brewer and Gardner (1996)

Table 6. Papers citing Social Identity from the ACM DIS conference

Authors	Date	Title	Major Work Cited
Ellis, J. B. et al.	2008	Games for virtual team building[42]	Tajfel (1974)

Table 7. Papers citing Social Identity from the ECSCW conference

Authors	Date	Title	Major Work Cited
Weisband, S., Schneider, S., and Connolly, T.	1993	Participation equality and influence: Cues and status in computer-supported cooperative work groups[158]	Tajfel (1982b)
Nov, O. et al.	2013	Motivation-targeted personalized UI design: a novel approach to enhancing citizen science participation[112]	Tajfel (1982b), Hogg and Terry (2000)

Table 8. Papers citing Social Identity from the ACM GROUP conference

Authors	Date	Title	Major Work Cited
Pape, B. et al.	2003	E-community-building in WiInf-Central[116]	Tajfel (1982b), Tajfel (1982a), Turner et al. (1987)
Goggins, S. P., Laffey, J., and Tsai, I.	2007	Cooperation and groupness: Community formation in small online collaborative groups[53]	Tajfel (1982b), Tajfel (1982a)
Lampinen, A., Tamminen, S., and Oulasvirta, A.	2009	All my people right here, right now: Management of group co-presence on a social networking site[84]	Tajfel and Turner (1974)
Goggins, S. P., Galyen, K., and Laffey, J.	2010	Network analysis of trace data for the support of group work: activity patterns in a completely online course[52]	Tajfel (1982a)
Ricken, S. et al.	2014	Anyone for Bowling?: Coalescing for Shared Activities[126]	Turner et al. (1987)
Robert, L. P., and You, S.	2018	Disaggregating the Impacts of Virtuality on Team Identification[129]	Tajfel (1974), Turner et al. (1987)

Table 9. Papers citing Social Identity from the AAAI ICWSM conference

Authors	Date	Title	Major Work Cited
Agarwal, N. et al.	2009	A Social Identity Approach to Identify Familiar Strangers in a Social Network[4]	Tajfel (1982b)
Purohit, H. et al.	2014	On Understanding the Divergence of Online Social Group Discussion[120]	Turner et al. (1987)
Margolin, D., Liao, W., and Lin, Y.R.	2015	Conversing in Reflective Glory: A Systematic Study Using National Football League Games[100]	Tajfel and Turner (1974)
Maldeniya, D. et al.	2017	The Role of Optimal Distinctiveness and Homophily in Online Dating[98]	Brewer (1991)