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## Networks and Organizing Processes in Online Social Media

Editor

Seungyoon Lee

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Networks and Organizing Processes in Online Social Media

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Editorial

## Editorial: Networks and Organizing Processes in Online Social Media

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### Abstract

Online social media present unprecedented opportunities and challenges for a range of organizing processes such as information sharing, knowledge creation, collective action, and post-disaster resource mobilization. Concepts and tools of network research can help highlight key aspects of online interaction. This editorial introduction frames the thematic issue along three themes of networked processes: identity and identification; interaction patterns in online communities; and challenges and cautionary notes concerning social media organizing. A diverse range of country contexts, as well as theoretical and methodological approaches illustrated in this issue, represent the multifaceted research that scholars can undertake to understand networked organizing on social media.

### Keywords

emergent organizing; networks; organizational communication; online communities; social media; social network analysis

### Issue

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## 1. Introduction

Online social media present unprecedented opportunities and challenges for a range of organizing processes such as information sharing, knowledge creation, collective action, and post-disaster resource mobilization. Social media not only provide a ubiquitous channel of communication but also constitute the structure and space of organizing.

The phenomena observed on social media platforms sometimes support and sometimes defy traditional theories of organizing. On one hand, centralized individuals and organizations still play an important role, showing hierarchies and inequalities (Shaw & Hill, 2014). In addition, factors such as status and geographic co-location continue to be important aspects of organizing processes in online spaces. On the other hand, online organizing empowers mobilization without a pre-established or external structure of coordination. Individuals collaborate without tangible incentives, across physical and social boundaries, and through improvising ties from previously weak or nonexistent relationships (Lee, Benedict, et al., 2020).

This thematic issue showcases the value of network approaches for uncovering the structures of interaction on social media. Concepts and tools central to Social Network Analysis (e.g., Monge & Contractor, 2003) can help highlight relational patterns such as connectivity and segregation, leadership structure, strong and weak ties, and diffusion. This thematic issue publishes studies that examine these structures of networks on social media—e.g., who communicates with whom, who collaborates with whom, and who forms groups with whom—to provide insights into the ways in which social interaction shapes emergent outcomes. Three major themes are discussed below.

## 2. Identity and Identification in Emergent Organizing

Ubiquitous communication through social media allows emergent organizing in response to evolving social issues or crises. Social technologies are the organizing agents of collective mobilization in which diverse actors connect with each other often without pre-existing structures or history of collaboration (Majchrzak et al., 2007; Segerberg & Bennett, 2011). Thus, how people form

attachments and identify with other members and groups is a core question for understanding collective mobilization (Ren et al., 2012). The first two articles address the identity of individuals, groups, and leaders in two different contexts of emergent organizing.

Benedict (2022) examines emergent connections formed through Facebook groups after the wildfires of 2018 in California. Facebook groups were coordinated by citizens themselves, and survivors engaged in resilience by identifying with multiple Facebook groups and their members. The study details the ways in which linguistic and communicative choices shaped the identity of both survivors and helpers. Further, while survivors and helpers were the key agents of organizing, this study points to an aspect of traditional leadership reflected in the role administrators played in defining the identity and demarcating boundaries of their groups.

Sorce (2022) provides an analysis of protest mobilization in the 2019 Fridays for Future movement. Interviews with protesters show that several dimensions of Greta Thunberg's identity—age, gender, disability, and class—were perceived differently depending on participants' demographics. The author encourages a nuanced understanding of leadership in social movements, as Thunberg's communication through social media was central to Fridays for Future but her status as a leader was not as commonly acknowledged by activists.

### 3. Tracing Interaction Patterns in Online Communities

Online communities have transformed the ways in which people co-create and integrate knowledge (Faraj et al., 2011), share information and support (Kim & Lee, 2014; Lee, Chung, et al., 2020), and find company for socialization and bonding (Ridings & Gefen, 2004). Relatedly, communities of practice (Wenger, 2000) group together people with shared interests or goals to learn from and support each other. The next group of articles shows the promise of using a high volume of data on social media to examine various aspects of communication in online communities.

First, Foote (2022) highlights systems theory as a framework for investigating complex interdependencies and longitudinal trajectories present in online interaction. The article shows how the unique characteristics of online communities invite communication researchers to adopt systems theory perspectives for both holistic and granular understanding of online organizing. Interested researchers will find useful insights from the examples of research questions—e.g., making community-level comparisons, tracing individual-level participation, and modeling the interaction between local behaviors and global system output—and the examples of data sources that can be used.

The next two articles show examples of utilizing trace data present in online communities. Eddington and Jarvis (2022) consider a hashtagged space, #AcademicTwitter, as an online community of practice which helped

enact resilience labor. By examining frequently mentioned themes in the semantic network of tweets, the authors observe how college instructors responded and adapted to the Covid-19 pandemic. They suggest that the communicative processes on Twitter helped people to: (a) engage in sensemaking about their experiences of online transition; (b) share information and knowledge; and (c) exchange social support.

Wang (2022) introduces a recent feature of entertainment-oriented streaming platforms: Danmu commenting. This unique communication practice allows users to flexibly engage in interaction in real time. Paradoxically, the lack of a structured interface which makes it difficult for users to address others and reveal their authorship also nurtures a sense of belonging and shared enjoyment. The article showcases a qualitative method of analyzing online communication content to examine both the relational patterns among comments and their linguistic features.

### 4. Challenges and Cautionary Notes Concerning Social Media Organizing

Affordances of technologies are enacted differently depending on the people who use the technologies as well as the context in which they are used (Leonardi & Vaast, 2017). There are constraints and risks associated with the unique communication patterns of social media, which can be explained by both the individual level (e.g., motivation, ideological preferences, status, and demographic characteristics) and environmental level factors. The last three studies in this thematic issue shed light on the dark side of organizing on social media.

Chiu et al. (2022) utilize an ingenious study design to conduct a comparative analysis of how true news and fake news about a political controversy diffuse in different forms. The study identifies clusters from networks of users who engage in retweets or mentions. The authors quantify how many people a tweet reached at what speed, and whether the diffusion took the form of broadcast or person-to-person transmission. The results provide evidence of risks associated with fake news tweets, which tend to start to diffuse early and spread to a larger number of people at a greater speed.

In another study utilizing Twitter data, Esteve-Del-Valle (2022) identifies potential risks of echo chambers and network polarization. The author finds that holding similar ideological views explains a higher likelihood of mentions among Catalan MPs but not among Dutch parliamentarians. Such contrast in homophily is possibly due to a more established democratic party system in the Netherlands which encourages coordination among parties. This study offers support for the argument that system-level interactions on social media can be better understood by considering the characteristics of individual members and the broader social contexts.

Lastly, while social movements are one of the central contexts of online organizing, there are associated

challenges. Navarro and Gómez-Bernal (2022) examine how Spanish feminist organizations utilized social media accounts in the context of 2018 International Women's Day events. The authors show that there were unclarity around how the multiple committees should organize together to maintain a collective identity. The authors also provide critiques about forms of activism geared toward gaining attention on online platforms rather than engaging in social change. Their discussions of Slacktivism, pop feminism, and commodity feminism provide a cautious look into the legitimacy of online organizing.

## 5. Conclusions

In addressing these three themes, the studies illustrate the utility of network theoretical and methodological perspectives for understanding online organizing. Digitally networked spaces themselves reconstitute the relationships among actors and actions (e.g., Segerberg & Bennett, 2011). Unpacking the processes of these interconnections, in addition to examining the characteristics of users or the technological features of social media themselves, can push the boundaries of future research. The range of social and country contexts examined by work in this issue also demonstrates just how multifaceted the landscape is for research on networked organizing processes on social media.

## Conflict of Interests

The author declares no conflict of interests.

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Article

## Entanglements of Identity and Resilience in the Camp Fire’s Network of Disaster-Specific Facebook Groups

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### Abstract

The Camp Fire in California (November 2018) was one of the most destructive wildfires in recorded history. Dozens of Facebook groups emerged to help people impacted by the Camp Fire. Its variety and prevalence throughout recovery make this network of disaster-specific, recovery-oriented social media groups a distinct context for inquiry. Reflexive thematic analysis was performed on 25 interviews with group administrators and publicly available descriptive data from 92 Facebook groups to characterize the composition of the network and explore identity in the groups. Group members’ identities fell into two categories—helpers and survivors—while the groups consisted of six identities: general, specialized, survivor-only, pet-related, location-specific, and adoptive. Administrators established group identity around purpose, through membership criteria, and in similarity and opposition to other Camp Fire Facebook groups. The findings contribute to social identity theory and the communication theory of resilience at the intersection of resilience labor, identity anchors, and communication networks.

### Keywords

disaster recovery; Facebook groups; resilience; social identity; social media; social networks

### Issue

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### 1. Introduction

The Camp Fire started in Butte County, California, on November 8th, 2018, and became the state’s most destructive fire (Sciacca & Krieger, 2018). Many of the 50,000 evacuees lost everything and became displaced (Sabalow et al., 2018). While trying to rebuild their lives after the Camp Fire, resources were often difficult to access, insufficient, and/or nonexistent. Additionally, with the loss of their physical community, residents of Camp Fire-impacted counties struggled to stay socially connected and maintain their relationships with strong and weak ties (Brown, 2022).

The disaster prompted the emergence of a network of Facebook groups intended to help people impacted by the Camp Fire (i.e., Camp Fire Facebook groups [CFFGs]). By December 2018, over 30 CFFGs were created with probably over 100 existing since evacuation.

CFFGs boomed locally, nationally, and even internationally and provided extensive support to the fire-impacted communities, serving as “a sort of ad hoc social safety net in the absence of institutional support” (Hagerty, 2020, para. 16). Its magnitude and its prevalence in the resilience organizing of everyday citizens after the Camp Fire make the network of CFFGs a distinct context for inquiry.

Along with its significance to recovery, the network of CFFGs also exemplifies how group identities can vary across social media groups dedicated to organizing disaster response and recovery. Potential members could find a space, or spaces, to engage in resilience organizing that fulfilled their needs and goals. Exploring the relationship between resilience organizing and identity is important for understanding transformative processes after disasters (Agarwal & Buzzanell, 2015), and examining the network of CFFGs contributes to this knowledge.



While research commonly addresses social media use after disasters, no studies have comprehensively analyzed a network of Facebook groups devoted to a specific disaster, to my knowledge. Researchers have studied the identities of two groups after a blizzard in Denmark (Birkbak, 2012) and the functions of a few groups after flooding in Europe (Kaufhold & Reuter, 2016), Australia, and New Zealand (Bird et al., 2012; Taylor et al., 2012). Most other examinations consider Facebook groups as one of many sources and channels of support for survivors (e.g., Li et al., 2019). Therefore, devoting attention to this network of Facebook groups devoted to a single disaster and its members advances understandings of how social media groups are used in resilience organizing and what the role of identity is in said groups.

This study explores how identity is entangled in a massive network of social media groups dedicated to resilience organizing after a disaster. I primarily use reflexive thematic analysis (Braun & Clarke, 2019, 2021) performed on data from interviews with CFFG administrators, as well as publicly available descriptive data about the CFFGs from the groups themselves. First, I characterize the composition of the network of CFFGs, with attention to both the groups and the people in the network. Second, I explore the anchors of group identity established by administrators in CFFGs. Characterizing the composition of the network provides a description of this practically compelling instance of online resilience organizing after a disaster, while exploring group identity anchors contributes to theorizing the relationships between networks, resilience, and identity.

## 2. Intersections of Resilience and Identity

During and after disasters, disaster-impacted individuals and volunteers engage in resilience labor. Resilience labor is “the dual-layered process of reintegrating transformative identities to sustain and construct organizational involvement and resilience” (Agarwal & Buzzanell, 2015, p. 422). Individuals engaging in resilience labor are empowered by their connections with other people, groups, and organizations and use language to highlight their familial, ideological, and destruction-renewal relationships, all while reintegrating their identities (Agarwal & Buzzanell, 2015). In the case of the Camp Fire, group members negotiated their personal identities, especially related to the Camp Fire, while navigating the network of online spaces for resilience organizing and their recovery.

Resilience labor highlights the intersection of social identity theory (SIT; Tajfel & Turner, 1986) and the communication theory of resilience (CTR; Buzzanell, 2010, 2019). In SIT, people’s social identities are emphasized. Social identities consist of the elements of oneself that are derived from the social categories in which one believes themselves to belong (Tajfel & Turner, 1986). The two fundamental processes of identification from the perspective of SIT are categorization

and self-enhancement (Pratt, 2001). Categorizations are “cognitive tools that segment, classify, and order the social environment” (Tajfel & Turner, 1986, p. 15). From social categories, social groups are established. These social groups agree on how they define and evaluate themselves, both within the group and compared to other groups; members form their individual identities around their belongingness to the groups.

Social identities and relationships are integral parts of resilience in the CTR. The CTR positions resilience as the communicative process of “reintegrating after difficult life experiences” (Buzzanell, 2010, p. 1) and seeks to understand and explain how resources are utilized discursively and materially through adaptive-transformational processes to constitute new normals after adversity (Buzzanell, 2019). The CTR posits people engage in five processes as they confront disruptions: crafting normalcy, foregrounding productive action while backgrounding negative feelings, affirming identity anchors, maintaining and using communication networks, and constructing and putting to work alternative logics (Buzzanell, 2010, 2019).

Affirming identity anchors also unifies SIT and the CTR. Identity anchors are people’s strongest identities or those they choose to emphasize. After wildfires, communities work to strengthen their identities and return themselves to normal (Cox & Perry, 2011). By anchoring their identities, people explain who they are and how they relate to others (Buzzanell, 2010). Examples include Christians placing trust in God (Black & Lobo, 2008) and fathers experiencing joblessness centralizing their head of household roles (Buzzanell & Turner, 2003). Affirming identity anchors can facilitate self-enhancement and define people’s relationships with each other and with events, like the Camp Fire.

Using and maintaining communication networks also connects SIT and the CTR. CFFGs offered a network of potential social relationships both within and across groups to facilitate recovery. Joining a single CFFG, fire-impacted individuals could access the resources (e.g., relationships, information, and goods) available in one social media group and could identify with members of said group or the group itself. However, group members reported participating in 15 or even 40 CFFGs (Hagerty, 2020). SIT explains how people can identify with multiple targets (Scott & Stephens, 2009), even when those identities are in contest with each other (Pratt, 2001).

The network’s size likely facilitated, and necessitated, the establishment of group identities. Developing a meaningful and strong group identity through interactions is a strength of computer-mediated groups (Postmes et al., 2000). Consequently, the large number of groups probably enabled members to join or leave CFFGs based on their needs, goals, and experiences.

While networks of Facebook groups devoted to a single disaster have received minimal attention, research has examined the existence of multiple Facebook groups

for other adversities. For example, a systematic search for Facebook groups for diabetes-related foot problems identified and analyzed 57 groups (Abedin et al., 2017). Large networks of Facebook groups are common, but the large number of Facebook groups dedicated to such a small, localized population is uncommon. Membership in multiple groups in the network of CFFGs likely facilitated the exchange of depth and breadth of support that is not available in a single group.

This study examines the composition of the network of CFFGs with particular attention to the entanglements of identity. Exploring the network of CFFGs provides opportunities for building practical knowledge about the role of multiple disaster-specific, recovery-oriented social media groups in recovery from disasters and for integrating and extending SIT and the CTR. Thus, two research questions are posed:

RQ1: What is the composition of the network of CFFGs?

RQ2: What anchors of group identity were established by administrators in the CFFGs?

### 3. Method

I learned about the Camp Fire shortly after it started while listening to National Public Radio. In November 2018, I joined my first CFFG out of personal interest. I had no prior connection to the Butte County community and no intention of studying the Camp Fire. I spent days and nights scrolling through the posts, “liking” a few but never commenting or posting until much later, when I began recruitment for this research. About one year after the Camp Fire began, I decided to study recovery from the Fire in CFFGs, while being involved in only a handful of CFFGs at the time. I could not help in the most needed ways: by providing information and tangible goods (especially money). However, I could help by using the resources available to me to study the Camp Fire recovery, especially its online elements, and share the experiences of group members with their community and other disaster-impacted communities, disaster managers, and scholars.

In August 2020, 21 months after the Camp Fire started, I received Institutional Review Board’s approval to recruit administrators for interviews. At this time, I began preliminary analyses. I created a repository of CFFGs, starting with a directory of social media resources for former residents on the website Butte 211 Camp Fire (n.d.). I put the 28 CFFGs listed into a spreadsheet and used relevant search terms from the groups (e.g., Camp Fire, Paradise Fire, Butte Fire) to locate additional CFFGs. I aggregated publicly available information from the CFFGs (i.e., group name, whether the group was public or private, creation date, number of members, number of administrators and/or moderators, names of administrators and/or moderators, and descriptions

from the “About” tab) and performed descriptive statistics on the quantitative data. I also familiarized myself with the group names and descriptions to understand their goals.

Because they allow access to information that cannot be directly observed (Patton, 2002), I interviewed administrators to learn about CFFGs. The interview population was current administrators of one or more CFFGs. In the preliminary analyses, I identified roughly 164 administrators and 51 moderators for about 215 total leaders. Administrators were recruited using private messages on Facebook. I recruited 102 administrators in five waves from August 25th to September 14th, 2020. To start, I messaged administrators of two or more CFFGs and of the largest CFFGs. Then, I messaged the first administrator listed from the next largest groups. Around the third wave, I noticed all the administrators who were interested in and able to be interviewed were women. In reviewing the list of administrators, around 90% had traditionally feminine names. Therefore, in the later waves, I targeted administrators with feminine names for homogeneity.

The sample was 25 administrators of at least one CFFG at the time of the interviews. Interviewees, who were all women and mostly White, ranged in age from early-20s to early-70s. Five interviewees identified as survivors of the Camp Fire. The administrators represented over 30 CFFGs, leading one to several groups each. In two instances, two interviewees were administrators of the same CFFG.

Semi-structured phone interviews were conducted between August 29th and September 20th, 2020, about two months before the Camp Fire’s two-year anniversary. The interviews were recorded and averaged about 89 minutes (range: 65 to 116; median = 85). Interviewees were compensated with a \$15 Amazon gift card. The interviews demonstrate rigor with over 2,220 minutes (37 hours) of data coming from conversations with over 15% of the population of interest (i.e., administrators of one or more CFFG at the time of interview).

To explore the network of CFFGs, I asked administrators how they learned about CFFGs or decided to get involved with CFFGs. I also inquired about the goal(s) of their group(s), the potential the administrators saw their CFFGs as having, and the role other CFFGs played in the creation of their CFFGs. I encouraged administrators to estimate the proportion of group members who were survivors versus helpers, which led to conversations about the members of their groups. Administrators also spoke in detail about their day-to-day responsibilities and whether and how they enforced rules in their groups.

### 4. Data Analysis

I used reflexive thematic analysis to analyze the data, following the six-phase process articulated by Braun and Clarke (2021): familiarizing oneself with the data,

coding systematically, generating initial themes, developing and reviewing themes, refining themes, and reporting themes. Regarding reflexivity, assumptions from SIT and the CTR informed my engagement in reflexive thematic analysis (Braun & Clarke, 2019), such as the acknowledgment that people engaging in resilience may identify with multiple identity anchors. However, the analyses were inductive, meaning theory did not provide a lens through which the data were initially coded. Both semantic and latent coding—seeking explicit or surface-level meanings and hidden or deeper meanings, respectively—were used to descriptively and interpretively analyze the data (Byrne, 2021). Various identity anchors were identified as central organizing concepts (Braun & Clarke, 2019). My experiential orientation allowed me to prioritize how identity anchoring was experienced by administrators (Byrne, 2021), rather than interrogate the constraints that may have influenced these identities and anchoring processes. During analysis, themes ideally met three criteria: recurrence, repetition, and forcefulness (Owen, 1984).

Triangulation of the preliminary analyses of the repository of CFFGs and the interviews with administrators offer credibility to the findings, as does my passive participation in CFFGs over the last three years. For RQ1, I summarized the comments from administrators to characterize the composition of the network of CFFGs, including the groups themselves and the members of the groups. I also present themes representing the group identities of CFFGs in the networks, which are derived from the semantic coding of the group names and descriptions. That coding is represented in a multi-level network graph I illustrated using Ucinet (Borgatti et al., 2002) and the data from the repository to detail the composition of the network of CFFGs. RQ2 is addressed with both semantic and latent coding, where three themes illustrate the anchors of group identity established by administrators.

Their visible involvement in the Camp Fire recovery makes protecting administrators' confidentiality and anonymity essential. Only basic descriptions of the interviewees, CFFGs, and interviewees' experiences are described. {Braces} indicate details in a quotation were changed or omitted that may reveal the identity of a person or group, while staying true to the administrators' narratives. [Brackets] provide clarification, such as for pronoun use, and ellipsis (...) demarcates quotations being shortened for brevity. Interviewees' quotations are marked only with (Admin), given the chance that readers could string together the quotations to identify the interviewed administrators. This resonance and ethical consideration are criteria for qualitative quality (Tracy & Hinrichs, 2017).

## 5. Results

The results illustrate CFFGs and the network of CFFGs with attention to identity. To start, I describe the compo-

sition of the network of CFFGs, with a focus on the groups in the network and the people in the network. Then, I showcase the anchors for establishing group identity.

### 5.1. Composition of the Network of Camp Fire Facebook Groups (RQ1)

Over 100 CFFGs likely existed since the Camp Fire evacuation. In my preliminary analyses, I identified at least 92 groups. However, groups may have been deleted prior to or added since August 2020. CFFGs may also be missing if their names did not include relevant search terms or if they were "hidden" (i.e., do not appear in searches and require an invitation from a current member). The objective consistent across the network of CFFGs was "getting survivors help...that was the only goal" (Admin).

#### 5.1.1. The Groups in the Network

CFFGs had six distinct, yet overlapping, group identities: general, specialized, survivor-only, pet-related, location-specific, and adoptive. Figure 1 provides an overview of the group identities, which are discussed throughout the results.

The network of CFFGs is illustrated in Figure 2. The network graph depicts the six group identities as nodes (black circles). The squares (public groups) and triangles (private groups) represent each individual CFFG in the network. Key descriptive information including group size (node size) and creation date (node color) are also represented. A tie, illustrated as a line between nodes, indicates that an individual CFFG (triangle or square) holds the group identity represented by the adjacent black, circular node.

Each CFFG can have multiple group identities, which is what makes this network possible. For example, the green square between adoptive and pet-related represents the CFFG "Paradise Fire Adopt a Family 🐶🐱 With Fur Kids," while the yellow triangle between survivor-only and specialized represents the group "Camp Fire My Home Survived but...."

The network of CFFGs began forming during evacuation. Around four groups formed the day the Camp Fire started, with about 20 more added in the following week, and about 40 more added by the end of 2018. An administrator who survived the Camp Fire and got involved in CFFGs at least a week after the Fire explained:

I was probably late to join the social media circus, and I call it that, but it's really very helpful. There were already a lot of groups starting that were trying to help. There [are] a lot of groups that are not even in existence anymore. (Admin)

The color of the nodes in the network graph represents when each group was created.

The CFFGs varied in their size, represented as the node size in the network graph, and number of leaders.

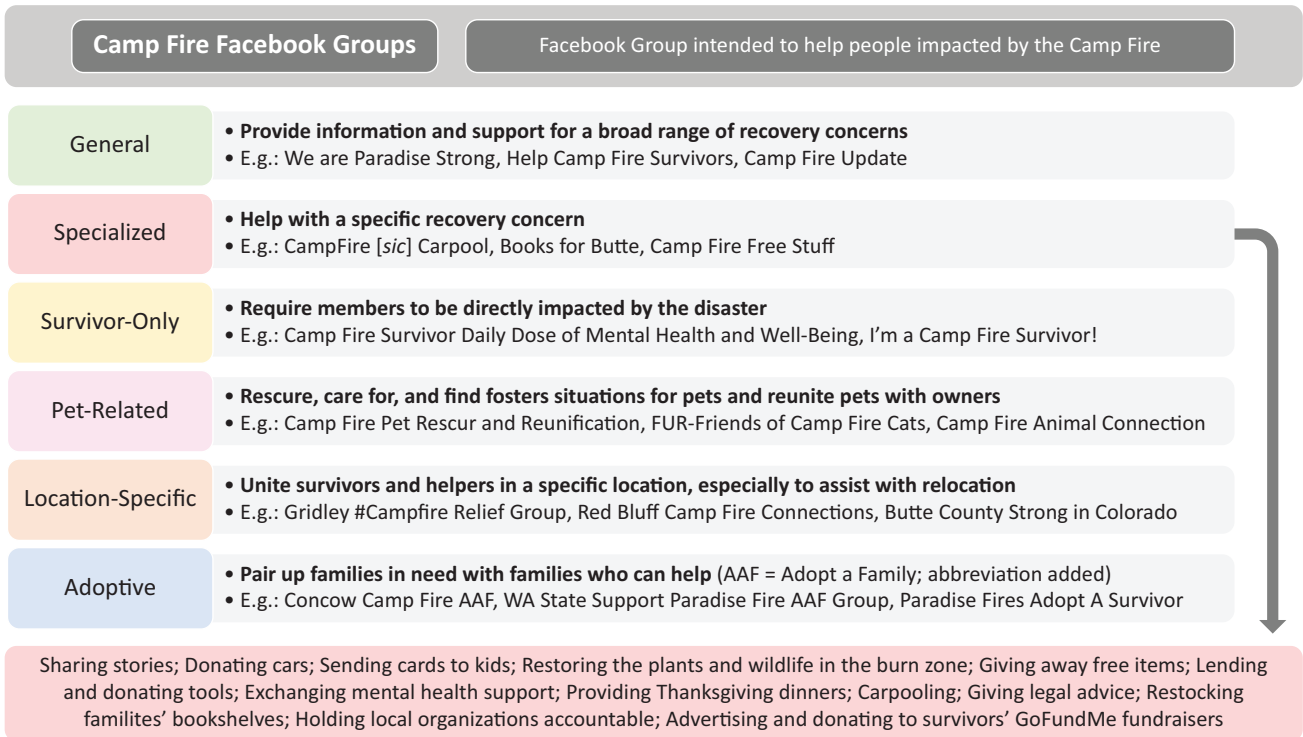


Figure 1. Six group identities of CFFGs with definitions and examples.

In August 2020, the average group size was about 1,150 members with a median group size of 317 members (range: 5 to 25,000 members). The total number of members was over 100,000 members, though users could be members of multiple groups. The mean number of administrators and moderators per group was around two leaders, with the median and mode being one leader (range: 0 to 9 leaders).

The privacy of CFFGs existed on a continuum and is indicated by node shape in the network graph. Fifty-five CFFGs were public, and 37 were private. Many administrators kept their CFFGs open to anyone who agreed to adhere to the group's rules, while others engaged in various actions to keep their groups private or more closed. For example, when asked if potential members needed to answer screening questions, an administrator stated,

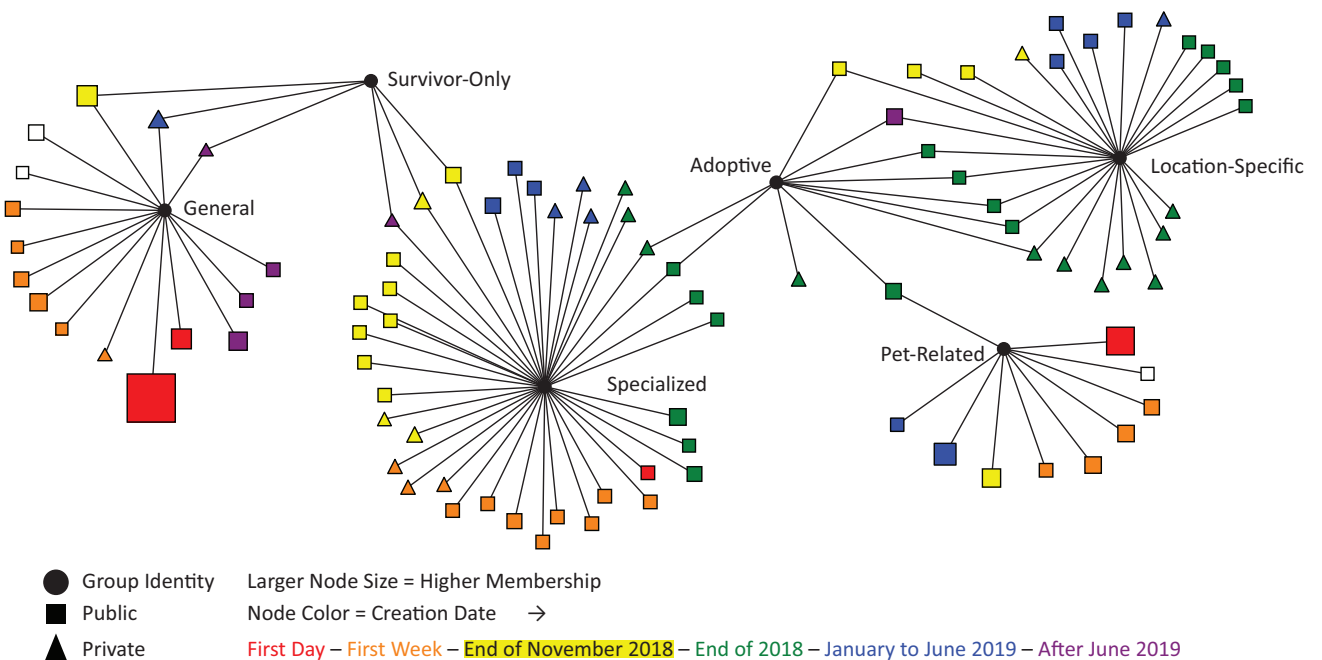


Figure 2. Network graph of CFFGs where ties represent holding a group identity.

“No, I just made [the group] public. I could either approve memberships or somebody that was already in the group could allow or invite somebody to join” (Admin). Having public or more open groups made it easier for helpers from around the world to get involved. However, having private or more closed groups helped administrators cultivate safe spaces for specialized assistance and specific populations of people.

Differences existed in the scope of CFFGs. Some administrators had grand intentions, while others were more modest. An administrator whose “goal was to get everybody the most important things: jobs and houses {or at least a trailer}” elaborated: “It was [about] helping fully instead of making myself sparse. I wanted to help somebody all the way through the process and getting them safe and set up before I went to the next person” (Admin). Working with impacted individuals from the start of their recovery through achieving stability and normalcy was the ideal scenario for many adoptive and location-specific CFFGs. Many adoptive CFFGs were also location-specific, as shown in Figure 2, which enabled administrators and helpers from afar to support survivors relocating to their geographical area and could produce deep, long-lasting relationships.

However, most groups assisted on smaller scales, providing bandages for literal and metaphorical wounds from the Camp Fire:

I think the goal overall of all the groups is just to try and like give a Band-Aid of some sort and then like really lofty goals....If I could just give them back what they lost...if they could just...have something to call home again....That'd be cool but mostly we're going to give blankets and t-shirts and they're going to have a car full of new [stuff]. (Admin)

Another administrator invoked the bandage metaphor regarding the goal for her CFFG:

[We] decided we needed to do something that was more long-term, that it wasn't just a quick fix or a band-aid. It's something where we could provide access to resources for people....Trying to really help people move towards a more permanent solution for their issues than just I need \$30 for gas. (Admin)

This quotation highlights how the groups provided first-aid for impacted individuals but also sought to heal the source of their wounds and provide literal and metaphorical rehabilitation to promote their recovery.

### 5.1.2. The People in the Network

Group members used “survivor” and “helper” to describe their relationship to the Camp Fire. The linguistic choices of these identities appeared intentional and meaningful. Only ten administrators even used the word “victim,” with a maximum of three instances in one inter-

view; “survivor” was dominant. One administrator who used “victim” even stopped to correct herself, saying a helper was “trying to deliver things to victims. Um, or, sorry, not victims. Survivors” (Admin). Administrators seemed careful to use the language of survivorship.

Survivors' membership in CFFGs was unusually high. There were 5,800 members of the private group “I'm a Camp Fire Survivor!” (n.d.) in June 2021. With membership being exclusively granted to survivors of the Camp Fire, possibly 10% of the 50,000 evacuees were still members over 3.5 years after the Fire.

CFFG members used “helper” to describe people from across the globe who provided support in the groups. An administrator described how their co-administrator would “recruit helpers,” saying “that was kind of the language: helpers and survivors, as opposed to donors and the needy or victims or something—language is important” (Admin). Many administrators acknowledged that a wide range of supportive behaviors could make someone a helper. Although people from around the United States and the world led and participated in the recovery, local members were uniquely positioned to provide support, especially as “boots on the ground” (Admin).

Being a “helper” could raise dilemmas. When asked about the kind of challenges related to administrating her group, one interviewee reflected:

[We need to] balance being on guard and protecting the helpers who are giving their money while also keeping an open heart and being so sensitive to the fact that, in vetting people and in making sure that situations are not sketchy, people are opening up their lives to us....I think that's been the biggest challenge for me over time is just planning out, how do I make sure that the situation is super legit and also make sure that this person that I'm wanting to come alongside—I try to say “come alongside” a person instead of helping them, because that's what we all want, right, when we're like down. And we all have those times in life. Some of us get hit harder than others like [the Camp Fire], but we don't want somebody coming to just help us. We want somebody to come alongside us, even if that means sitting and just being quiet when your day starts—[...is] legitimately needing help because I have absolutely run into situations where they were fake. (Admin)

This quotation describes difficulties related to the helper-survivor dynamic and the process of vetting people who wanted help to make sure they were actually survivors and not scammers.

Administrators recognized that not all helpers were actually helping. For example, “Not all [the group members] are nice. There's your basic Facebook trolls” (Admin). The groups also “started to get scammers” who tried to take advantage of the situation, which was “really hard” (Admin). Additionally, some members



observed but did not participate. Administrators mentioned inactive members who were not liking, posting, or commenting but did not speak at length about them. Several acknowledged how people may have observed for any number of reasons, like voyeurism or personal preference.

Knowing “survivors” and “helpers” were common terminology, I asked about the composition of survivors and helpers in administrators’ CFFGs. The composition of the groups and administrators’ certainty about the composition varied from very certain to very uncertain and from primarily survivors to primarily helpers. For example, an administrator of a generalized CFFG expressed:

I would say maybe 5%, maybe 10%, [of members] are actually survivors or people that were directly impacted by the Fire....From what they have commented on, you know if they were ones that lost their home or if they were ones that ran out of their houses with nothing but their pajamas on. Versus like I said, the vast majority of members that don’t comment and it’s kind of...yeah, you’re guessing. (Admin)

Another administrator described the proportion of her specialized CFFG as being “10 survivors to one helper” but admitted she was not sure “because some people weren’t as active doing stuff in the group. So, they may have been helpers and just kind of in the backdrop and doing stuff without being [visible] online” (Admin). These quotations highlight different compositions in the CFFGs and group members who did not leave visible traces of participation.

Determining the groups’ composition was also challenging because there were “a lot of people who were not only survivors, but helpers” (Admin). Administrators noticed some survivors started helping while the Fire burned. For example, when explaining the proportion of survivors and helpers in her pet-related group, an administrator advised:

I think, actually, the numbers [of survivors and helpers] go hand in hand. Everybody understood the pain and the loss, so even if they lost their [pets] themselves, they were willing to help, whether it was dedicating an hour a day to matching posts of lost and found [animals] or calling around for other people. (Admin)

For some, becoming a helper took time. Regarding “there [being] an overlap,” one administrator noticed how “a lot of the survivors have become active helpers, increasingly, so that’s pretty cool” (Admin). It appeared that “a lot of the survivors became helpers once they were stabilized” (Admin). Helping other survivors more actively was a turning point mentioned by administrators. For this reason and others, the groups’ compositions constantly evolved over time.

## 5.2. Establishing Group Identity (RQ2)

The six identities of groups described in Figure 1 and illustrated in Figure 2 provide a starting point for understanding how group identities were established by administrators. An administrator described how networks of Facebook groups emerge to address different aspects of recovery from the wildfires in California. She said:

There’s [sic] generally groups that are created on Facebook that, for lack of a better term, maybe compartmentalize different subject matters. Usually if you look, you can find a group say that strictly kind of does GoFundMes, and then you can find another group that’s like “Here adopt a fire victim family,” and then there’s another group that “If you’ve got any services that you can offer, post your message here.” It’s actually rare, I think, to find a group that encompasses all of that in the same group. (Admin)

In the case of CFFGs, administrators established group identity anchors around purpose, through membership criteria, and in similarity and opposition.

### 5.2.1. Around Purpose

The primary way administrators established group identity was around the group’s purpose. Some administrators were unsure *how* they wanted to help when they started their CFFG, which lent itself to general support. General CFFGs provided information and support for a broad range of recovery concerns. An administrator of a general CFFG explained how she had not considered for whom she created her group, elaborating:

[The group] was for those of us outside the area to support those people who were suffering from the Camp Fire. It was “Whatever we can do for you guys, we’re here”....I don’t think there was a real plan for what [the group] was going to do other than [say] “We’re here for you.” (Admin)

Contrarily, other administrators had a defined purpose for their CFFG that was communicated with group members, which was often the case for pet-related and location-specific CFFGs. An administrator of a pet-related CFFG described communicating the group’s identity around its purpose: “People would want to post fundraisers, stuff like that, and I would have to tell them, ‘Look, you’re going to have to do that in another group. We don’t do that on this group.’ This group is strictly for {pets}” (Admin). The groups’ purposes, and subsequently their identities, could be communicated in the group description, through posts in the group, and via direct interactions with members.

The best examples of establishing group identity around purpose are specialized CFFGs. Specialized groups carved out niches in the network to address a specific recovery concern and built their identity around

that concern. Certain groups became known in the network of CFFGs for providing particular support. For example, an interviewee complimented the administrator of another group while explaining specialization:

I think a group has to have a single focus or at least a primary focus, like [Named group]. It was only {this thing}. Some people were saying, “Well, can we do {that thing}?” and [the administrator] said, “Somebody else could create that group.” It gets too big and it’s hard to control. (Admin)

Despite specific foci, there were instances of flexibility, like in this case:

Every once in a while, we’ll get someone that’s posting about resources for survivors, and normally we don’t allow those kinds of postings because they’re not strictly about {what we do} but we figure some people need to find out about these resources....But pretty much the conversation has stayed to {what we do}....We try to really just stay in our lane with {what we do}. (Admin)

Concentrating on one facet of recovery helped curate a group identity.

A key action for establishing group identity around purpose was being selective about posts allowed in the groups. An administrator explained how she curated the group’s identity around providing information directly related to the Camp Fire. She recalled:

{Early on,} I didn’t approve any posts that were like, “We’re praying for you,” or well wishes, or anything like that....I wanted only pertinent, helpful, directly helpful information to be out there because, again, I opened my [CFFG] to be the one stop, if you will, of resources...of information....There was a lot of posts about animals for months [and even] after the first year about missing animals and where the animals are and reconnecting animals. And it was so much that I had to personally write [to] people, “This is not for animals. There is a [CFFG] for animals. Here’s the link.” And I even have those links within our announcements within our own [CFFG] where [people] could go, but I really wanted my CFFG to be direct information to help people survive,...find resources, clothing, food, shelter, and then how to rebuild. (Admin)

Being selective about the posts in their CFFGs often meant using post approval, like in the quote above, but could also mean deleting posts or comments that did not help accomplish the purpose of the group.

### 5.2.2. Through Membership Criteria

Administrators also established group identity through membership criteria. Many private CFFGs aimed to serve

members of specific populations, such as only Camp Fire survivors or people who lived in specific geographic locations. For survivor-only CFFGs, groups existed for all survivors and for only survivors with standing homes. For location-specific CFFGs, groups were tailored to different states (e.g., Arizona, Oregon, Idaho) and other California cities and counties (e.g., Kincade, Orland, San Jose Bay, Sacramento). The identities of the groups, thusly, centered on the population being served.

A key action related to establishing identity through membership criteria was requiring potential members to answer a couple of brief questions. Most private groups, and even some public groups, asked screening questions. Questions addressed topics like where a person lived and what they needed or could offer. For example, one administrator explained: “They need to let us know, number one, if they’re a survivor or donor,...where they’re located, whether they’re able to {do deliveries}, and whether they agree to the rules of our [group]” (Admin). The two most common questions were if a person would follow the rules of the group and if they were a survivor or helper.

Administrators asked screening questions for three central reasons. First, wanting to get a pulse on who was looking *for* help and *to* help was a common motivation, as was wanting to ensure both survivors and helpers agreed on the terms of the help. Second, administrators sought to protect group members from people with malintent. For example, an administrator explained:

People make [up], and I actually saw where people make up, a Facebook [profile] and they say they were in the Fire and they put up a GoFundMe and they start getting money and they weren’t actually even there. So, there was fraud involved also. And so just to make it so that not anybody could join, {I added questions}. (Admin)

Protecting both survivors and helpers from scammers was a top concern for most administrators. Third, asking screening questions helped reinforce groups’ identities. Screening questions addressed membership criteria linked to the explicit or implicit identities of the groups.

### 5.2.3. In Similarity and Opposition

Administrators, lastly, established group identity in similarity with and, more often, in opposition to other CFFGs. With so many groups, administrators’ strategies for organizing support differed widely, as did the interactions in the CFFGs. Therefore, along with *what* purposes a CFFG had, differences existed in *how* the groups accomplished those purposes. For example, the content posted in the groups varied, as described by this administrator:

Some groups, it’s all about the drama. It’s all about, “Oh my gosh, this {really tragic thing happened},” which, I mean, we do some of that. We have to

make some announcements like that, but that's like all they do is post and, really, we just need people to work....It's okay to celebrate and mourn. And we do a little bit of that but, I mean, if that's all you're doing, that's not {helping}. (Admin)

Administrators commonly drew distinctions related to how their CFFG operated differently than others.

The temperament of the groups was a common distinguishing factor when administrators identified their CFFG in opposition to other groups. For example, emotions could become heated online. An administrator explained:

[People] will cuss somebody out in a heartbeat, and we don't allow that. I don't care that other groups will allow beating down other people. That's not what it's about....You're not there to tear others apart. You're there for a mutual {"I need help" or "I'm here to help you" or "I'm here to do what I can"}. (Admin)

Some differences existed because of actions taken, or not taken, by administrators to manage the groups, causing some competitiveness, conflict, and "catty crap" (Admin) to emerge occasionally.

A hub from which administrators established group identity in similarity and opposition was "Paradise Fire Adopt a Family" (PFAAF). PFAAF was one of the first, largest, and most influential CFFGs. An administrator explained: "[PFAAF] had over 30,000 members...from all over the world and literally thousands of dollars a day, like hundreds of thousands of dollars, filtered through that group to different people....Amazing things were happening" (Admin). The goal of adoption was one family helping one family, but adoptive CFFGs did not exclusively provide one-on-one support. Adoption appeared to indicate taking survivors under a metaphorical wing. PFAAF gained somewhat substantial local news coverage, and the size of PFAAF became a hindrance to its ability to share effective information and presented challenges for keeping track of posts and reaching consensus (Hagerty, 2020).

Around half the interviewees mentioned PFAAF explicitly, and their feelings about PFAAF ranged from very positive to neutral to very negative. PFAAF was described as "very successful" (Admin) by some, but others mentioned major issues, like possible fraudulence among survivors, helpers, and administrators, and comparatively minor incidences, like "trash talking" and ego-involvement. What transpired in PFAAF "could get shady" and created what some felt was "a really yucky situation" (Admin). PFAAF eventually became overrun by infighting, rumors, jealousy, and suspicion (Hagerty, 2020) and was deleted entirely by its administrators. Despite controversies surrounding PFAAF and its eventual dissolution, traces of the group remain in the network of CFFGs.

Helpers from PFAAF formed their own CFFGs, often establishing identities in similarity with and opposition to

PFAAF. Many of the location-specific CFFGs established group identity in similarity to PFAAF by using the language of "adoption" in their group description or group name. The mere inclusion of adoption in the group name or description, intentionally or unintentionally, establishes similarity in the groups' identities. However, some interviewees described purposefully emulating the approach of PFAAF in their own groups.

Contrarily, other administrators drew clear distinctions between their group and PFAAF, positioning themselves in opposition to it. For example, an administrator recalled:

What was happening for a while after the Fire was just a little bit less accountability for a long time. Like in [PFAAF], it was a little more like the wild, wild West sometimes, because there were rules but not like...there wasn't [sic] settings....So, there was a lot of like people calling each other out on post and we were like, we don't like that climate. (Admin)

Many interviewees formed relationships with other helpers through PFAAF. An interviewee explained how she didn't "really remember how the connection happened among administrators" for her CFFG but that it "must have been through [PFAAF]" (Admin). She elaborated:

[A co-administrator] wanted [our CFFG] to run in a way that was not going to get carried away, like she felt [PFAAF] had gotten. [PFAAF] had become this unaccounted exchange of money and goods at such a large level that it was just kind of set up for bad things to happen. So, she was very protective of that and has been since the beginning....There was kind of this octopus happening with many multiples of arms and I think that [other groups] just separated from [PFAAF], even though it started kind of in [PFAAF], as far as recruiting interest. (Admin)

PFAAF contributed to the Camp Fire recovery in meaningful ways, despite and because of problems that may have existed. The above quotation emphasizes how establishing identity in similarity and opposition was possible because of the interconnectedness of the network of CFFGs.

Almost all the administrators were members of other CFFGs, as were survivors. An administrator who was also a survivor explained: "I think I joined like every [CFFG] that was going because it was just a way that I could connect with all the different parts of my community...we could get a lot of information flowing to like everybody" (Admin). Many administrators discussed the closeness of the network but did not seem entirely aware of its expansiveness. For example, after I told an administrator how many interviews I conducted, she pondered: "Maybe there are a bunch of groups I didn't know about" (Admin). Members of the network of CFFGs



almost certainly did not know of all the CFFGs supporting Camp Fire survivors.

There was consensus among administrators that all the groups, helpers, and survivors played some role in the Camp Fire recovery. Although there could be tension and conflict within and across the groups, the network of CFFGs united in its goal of helping survivors:

This was a joint effort....In order for all of the people to get help who got help, it was a collaboration. It was definitely not one group was better than another group or one group was more helpful. It was everyone working together to make sure that things got accomplished and that no one got forgotten....There were a lot of people and I'm sure, I mean, I'm positive we didn't help everyone, but we did help a lot. (Admin)

Administrators' resilience organizing and identity work, alongside the resilience labor of survivors, helpers, and other leaders, built the network of CFFGs into an interconnected online community.

## 6. Discussion

This study presents an exposition of a network of probably over 100 social media groups devoted to a single disaster. CFFGs varied in their sizes, privacy, and scope and provided spaces for resilience labor and identity work. To my knowledge, no detailed accounts exist of the use of so many social media groups, some with very large sizes, to provide such comprehensive support to such a small population that dealt with such an extreme disaster. Describing the composition of the network of CFFGs, as well as the entanglement of identity in CFFGs, documents this theoretically and practically compelling case of online resilience organizing after a disaster.

Findings from this study extend knowledge about supporting survivors' recovery from disasters and about disaster response networks. Survivors' utilization of CFFGs was much higher than would be expected, and has been observed, for Facebook groups devoted to other adversities. For example, a systematic search of hypertension-related Facebook groups identified 16 open Facebook groups with a total of 8,966 members (Al Mamun et al., 2015), but hypertension impacted about 29% of American adults in 2015 (Fryar et al., 2017). Therefore, a very small portion of the hypertension-impacted population was using hypertension-related Facebook groups, which contrasts with the Camp Fire where possibly 10% or more of the impacted individuals were members of a CFFG. The findings here highlight the opportunities of social media groups for survivors when offline communities are destroyed.

Organizing recovery from the Camp Fire in Facebook groups also exemplifies the influence of everyday citizens, who are often overlooked, in disaster response networks. Scholars argue understanding the power dynam-

ics involved in collaborating and coordinating in disaster response networks is vital to combining resources and accomplishing a common goal (Boersma et al., 2021). Integrating citizen-driven social media groups, such as CFFGs, into formal disaster response networks offers a more comprehensive depiction of the resilience labor occurring after a disaster. Additionally, partnering citizen-driven social media groups with more formal offline counterparts (e.g., relevant government agencies and non-profits) may provide mutually beneficial relationships. For example, if county-level animal control or local humane societies partnered with pet-related social media groups, more animals may be rescued and rehomed using fewer resources.

This study also progresses resilience theorizing, wherein resilience involves organizing relationships and material and discursive resources. Two theoretical contributions center on the recognition of "survivor" and "helper" as two primary identity anchors for members in CFFGs. The CTR (Buzzanell, 2010, 2019) holds affirming identity anchors as a crucial process of resilience and a central part of engaging in resilience labor during and after difficult life experiences. The categories of "survivors" and "helpers" seemed to invite members into active roles, where survivors were overcoming adversities, and helpers were recognizing themselves as contributors. A third theoretical contribution is related to how the affirmation of a social group's identity anchors may have implications for the resilience of members of that social group.

First, this study demonstrates how identity anchors can be affirmed on behalf of other people as a way of initiating or reinforcing their resilience. Administrators purposefully used the language of "survivorship" (e.g., highlighting someone is overcoming something bad that happened) rather than "victimhood" (e.g., acknowledging that something bad happened to someone). Along with administrators, offline helpers also recognized people whose health was not immediately compromised by the Camp Fire as survivors (Rosenthal et al., 2021). Thus, the resilience of impacted individuals was facilitated by affirming their identities as survivors, rather than victims. Even if the impacted individuals had not adopted an outlook of survivorship, this language encourages survivors to construct alternative logics whereby they have strength and agency and may enable self-enhancement.

Second, this study also reveals how identity anchors among individuals and the people in their network can be in conflict. Many members of CFFGs who did not survive the Camp Fire, and even some who did, adopted the language of "helper" to describe their role in organizing resilience. When positioning themselves as helpers and affirming that identity anchor as a way of engaging in their own resilience, members are putting into words the dynamic of their relationship with the individuals impacted by the Camp Fire. While not explicitly stated, the contrast of being a helper is being helped. Although social stratification may be

unintentional, affirming identity anchors that are in conflict with each other may produce various negative outcomes, such as feelings of shame, indebtedness, or supremacy, which could hinder resilience rather than promoting it.

Insight from SIT informs why this language for the two primary identity anchors might have arisen and how it may influence power dynamics in social media groups devoted to disaster recovery. SIT acknowledges superiority and inferiority as factors playing into relationships between groups and status as an outcome of comparisons across groups (Tajfel & Turner, 1986). “Helpers” were, in a sense, constructing power in survivors with identity anchors, while at the same time deconstructing it through identity anchors. Thus, affirming identity anchors, such as “survivor” and “helper,” on behalf of others likely produces consequences related to how individuals perceive themselves, how they perceive members of their social network, and what their relationships look like. Continued exploration of both the benefits and drawbacks of affirming identity anchors on others’ behalf will contribute to understanding the social and communicative processes of resilience.

Third, this study illustrates how establishing the identities of social media groups creates opportunities for resilience. Across probably over 100 groups, six group identities existed: general, specialized, survivor-only, pet-related, location-specific, and adoptive. Affirming the identity of social media groups may allow people to better determine whether and how to involve themselves in the groups, which facilitates the maintenance and use of their own communication networks. This may also allow administrators to make room for other social media groups in the network to contribute meaningfully to recovery, which is a way of maintaining the network for everyone involved.

Administrators established the identities of their CFFGs around purpose, through membership criteria, and in similarity and opposition, which each have implications for resilience. Discussing identity is important for organizations who need to define themselves to stakeholders (Connaughton, 2005), who could be survivors, helpers, and other community partners in this case. Using the group’s purposes as identity anchors for the group allowed administrators to keep group members’ energies focused on supporting particular aspects of recovery. Enforcing a group identity around the membership criteria was also a way of proactively addressing sources of conflict. Using screening questions to cultivate membership around specific identity characteristics is a method for nurturing “safe spaces” in social media groups (Clark-Parsons, 2018), which allows members to foreground productive action by reducing the chance of negative feelings. Finally, using similarity and opposition could enable members to seek CFFGs that resemble other groups they like and that oppose groups in which they may have had a negative experience, which facilitates foregrounding productive actions.

The primary limitation is this study’s small population (i.e., administrators), which excluded other important helpers and leaders in the network. As a result, I take a top-down approach to understanding group identity by discussing the anchors of identity established by administrators. I do not delve into how other group members participated in building the groups’ identities and whether or how members’ perceived individual identities aligned with the groups’ identities. Though these perspectives are valuable, I achieved depth in understanding the experiences of administrators, rather than breadth of knowledge. In the future, gaining insight from other leaders, helpers, and survivors, and considering the role of other group members in establishing group identity would provide a broader understanding of networks of social media groups devoted to specific disasters.

In conclusion, this study contributes to practical and theoretical conversations by recording and analyzing this massive and influential network of social media groups dedicated to recovery from a single disaster. Camp Fire survivors experienced major disruptions to their social networks linked to their physical community’s destruction (Brown, 2022). Administrators established online spaces for resilience organizing that may not have otherwise happened offline. Analysis of the network of CFFGs also presents opportunities for thinking about how resilience can be enacted on behalf of populations facing adversity, especially through identity work.

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### Conflict of Interests

The author declares no conflict of interests.

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Article

## The “Greta Effect”: Networked Mobilization and Leader Identification Among Fridays for Future Protesters

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### Abstract

Drawing on walking interviews with 19 Fridays for Future (FFF) activists in Germany, this study focuses on Greta Thunberg by researching strikers’ perception, identification, and online networking practices with the movement’s central figure. With respect to protest mobilization and collective identity formation, this study finds that participants primarily identify with Thunberg via her class standing. While male activists highlight Thunberg’s gender as a mobilizing factor, female and non-binary activists often dismiss it, thereby distancing themselves from FFF’s feminized public image. Participants believe that Thunberg’s disability gives her an “edge” to generate media attention for FFF, calling it an asset to the cause. Although all participants engage with Thunberg via social media, many downplay her leadership role in the movement. Similarly, local organizers actively use Thunberg’s posts to build up their own online networks while routinely emphasizing FFF’s leaderlessness. The findings thus nuance assumptions about identity-based mobilization, explore the construction of networked leadership, and chart digital organizing practices in a transnational youth climate movement.

### Keywords

climate activism; Fridays for Future; Greta Thunberg; identity formation; intersectionality; networked leadership; protest mobilization; social movements

### Issue

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### 1. Introduction

In launching the transnational youth climate movement Fridays for Future (FFF), Greta Thunberg has mobilized a generation. Thunberg’s School Strike for Climate is FFF’s trademark event, drawing millions of young activists to the streets worldwide (Teune, 2020). In media reporting on the movement, journalists have been speaking of the “Greta effect,” a term that symbolizes Thunberg’s key role in generating a transnational climate movement that mobilizes youth all over the globe. As the initiator and face of the movement, Thunberg herself—an 18-year-old Swede with Asperger’s syndrome—is very present in the international media: In 2019, Thunberg was named “person of the year” by *Time Magazine*, an accolade not shared by many, particularly given her gender and age. She is routinely invited as a keynote speaker

at high-profile political events, has become an authority on climate crisis activism, and represents a new generation of activists.

Girls and young women become hyper-visible in the visual representation of FFF’s activities in international journalism (Hayes & O’Neill, 2021). Correspondingly, news articles around Europe have been running headlines such as “girls claiming world power” (de Velasco, 2019), stating that today’s eco-girls belong to “generation Greta” (Drury, 2021). This type of movement coverage—often accompanied by pictures of girls holding protest signs—overemphasizes gender and age as the two key factors in Thunberg’s mobilization effect, ignoring other aspects of Thunberg’s identity that youth activists might actually identify with more.

FFF brands itself a youth movement with global appeal that transcends identity politics. However, FFF is



not free from identity-based mobilization, as it specifically draws from a student activist base. Thunberg herself is a young, middle-class, white female with a diagnosed disability. Certain aspects of Thunberg's identity get pushed to the fore in public discourse and her figure has been under scrutiny ever since she gave her passionate "how dare you" speech at the UN Climate Summit in 2018. This appearance also cast the spotlight on Thunberg's self-organized school strike in Stockholm, spurring FFF collectives in every country across the globe (FridaysforFuture.org). Thunberg thus emerges as an intersectionally-branded leader in the media—her age, gender, and disability are discussed as playing together to mobilize youth activists. Ryalls and Mazarella (2021, p. 449) study how US and UK journalists construct Thunberg's persona, arguing that they simultaneously depict her as "exceptional *and* fierce *and* childlike," fostering the public's fascination with her. Indeed, a recent study found that 45% of strike participants assigned Thunberg a key role in their decision to join the movement (Wahlström et al., 2019) and another suggests familiarity with Thunberg impacts the intent to take collective action (Sabherwal et al., 2021). What remains to be explored is whether young activists join FFF because of their gendered identification with Thunberg and what role digital communication plays in this process.

As a youth movement, FFF organizers use the affordances of social media to engage with adherents. A look at FFF's social network across platforms reveals the attention paid to Thunberg's digital communication: As of spring 2022, Thunberg's follower tally on her official social media accounts nears 23 million, with 3.6 million on Facebook, 14 million on Instagram, and 5 million on Twitter. Her posts routinely receive upwards of 60 thousand interactions, making her a key node in FFF's digital network (see also Boulianne et al., 2020). While scholars credit Thunberg with a leadership role in the movement (Olesen, 2020; Sorce & Dumitrica, 2021), we know little about how FFF activists assess her role, how and why they identify with her, and how they network with her. Scholarship is needed that addresses the so-called "Greta effect" by speaking with protesters about their personal connection to Thunberg, nuancing perceptions of her role and motivational quality. This study builds on walking interviews with FFF strikers in a university town in Southern Germany. It seeks to address three central research questions:

RQ1: How do activists understand Greta Thunberg's role in FFF?

RQ2: How does Greta Thunberg's identity (age, gender, class, race, and disability) mediate motivation to join FFF?

RQ3: How is Greta Thunberg's online communication used in FFF's networking practices?

To ground this research, I explore interdisciplinary theoretical observations about networked leadership, leader intersectionality, and collective identity formation in social movements.

## 2. Networked Leadership and Identity Formation in Social Movements

FFF understands itself as a decentralized, grassroots movement, marking its presence in the public sphere via the power of "bodies in the streets" during their signature action: the Friday school strike. As their overarching social movement master frame, FFF engages the "environmental justice frame" (Čapek, 1993, p. 5). The movement notably capitalizes on the "future" narrative to engage youth. The plea to secure a livable planet for forthcoming generations transcends geographical areas, political boundaries, and cultural groups. In their study on depictions of protesters in German newspapers, Bergmann and Ossewaarde (2020) argue that journalists offer paternalistic reporting that trivializes young climate activists, thus underscoring the prevalent assumption that youth are apolitical and join FFF to skip school. However, age anchors FFF followers, drives the movement's "collective identity" (Polletta & Jasper, 2001; Tilly, 2002), and underscores the importance of identity formation processes for identification with activist campaigns (Terriquer, 2015).

Even though the movement does not officially proclaim a formal leader, Thunberg is the initiator of the weekly strike phenomenon that spurred the global youth movement. Scholars discuss social movements by looking at leadership as it connects to communication practices and mobilization efficacy. Melucci (1996) offers a typology of social movement leadership around a leader's central tasks: to define objectives, provide the means for action, maintain the structure, mobilize the support base, and maintain and reinforce the identity of the group. These tasks can also be accomplished in the digital space, though the very nature of grassroots networking on social media challenges its directionality. Indeed, Castells (2012, pp. 2, 229) argues that online networks help "movements spread by contagion" with online interactions as a key "component of...collective action." Van Laer and Van Aelst (2010) assert that new social movements actively incorporate digital actions into their repertoire, with digital communication as *the* channel for movements to become transnational. Though more pessimistic about the role of everyday users, Isa and Himelboim (2018) explain that some Twitter users become social mediators who amplify a cause and act as bridges in social movement network structures.

Thunberg's social media accounts are central to the agenda of the movement and play an important role for national and local collectives. A framing analysis by Sorce and Dumitrica (2021) shows that during the Covid-19 pandemic, Thunberg's posts were shared to

nearly every FFF country group on Facebook, establishing her as a key voice of the movement across Europe. Thunberg's public communication to her social media audience continuously underscores the urgency of the climate crisis by providing shareable posts. Though scholars have long argued that pure digital engagement with activist followers can weaken identity-based mobilization in movements (Benford & Snow, 2000), Thunberg harnesses the reach of social media. Thunberg thus forms a "core actor" (Isa & Himelboim, 2018) in FFF's digital network, while her role can be understood more closely with what Gerbaudo (2012, p. 18) terms "soft leadership" employed to "choreograph the assembly" of youth activists.

Gerbaudo (2012) understands soft leaders to perform one important core task when using social media: choreographing. In choreographing, these leaders use social media to "direct people towards specific protest events" by "providing participants with suggestions and instructions about how to act," which creates an "emotional narration to sustain their coming together in public space" (Gerbaudo, 2012, p. 12). Networked followers become the assembly, a conceptualization that relates to what Hardt and Negri (2004) previously theorized as the "swarm" of a social movement. Both Shirky (2008) and Castells (2012) dismiss centralized movement leadership in networked social movements by arguing that technology allows organizing without formal direction. Indeed, Hardt and Negri (2017) see leaderless movements as a product of historical developments toward more democratic representation. For FFF, it is fair to say that the movement is not a digital social movement but a network-supported one with a strong analog protesting history. Importantly, the movement draws on what Olesen (2020) terms Thunberg's mediated "iconicity."

Thunberg has long reached celebrity status as a person of public interest. While celebrity protest communication can reroute activists' attention on personal stories and sensationalized media coverage (Poell et al., 2016), this engagement can also increase the mobilizing power of mediatized movement leadership. As Gerbaudo and Treré (2015) argue, media representation and social media engagement with activist leaders fosters connection to the core messages of a movement. Relatedly, Poell et al. (2016) found that the role of leadership communication in social movements through social media is pivotal to activist branding and success. In employing Della Ratta and Valeriani's (2014) term "connective leadership," they argue that social media administrators fulfill arbitrator roles by creating or sharing posts that can set the agenda for a social movement. As an individual who creates an online community around her digital presence, Thunberg can thus be conceptualized as what Bakardjieva et al. (2018, p. 908) call a "sociometric star" in protest leadership. Indeed, Olesen (2020) highlights the performative aspect of Thunberg's social media communication, underscoring that she has become synonymous with the FFF movement.

A second strand of scholarship engages questions of identity work through communication in social movements. Issues of collective identity formation in activist groups permeate specific agendas. The question of how identity gets constructed within a social movement was a central concern for Melucci (1996): He asks who protesters really are and what issues they rally around. Melucci found that having personal connections to a cause that link with experience, culture, and identity drive protest mobilization and the feeling of belonging to the group. In feminist scholarship on coalitional movements, authors underscore the importance of bridging social differences to create more inclusionary activist spaces (Carillo-Rowe, 2008; Chávez, 2013). At the same time, becoming involved in a social movement can build a new or reformed sense of self. Correspondingly, Snow and McAdam (2000, pp. 46–47, 49) argue that identity formation processes occur on multiple levels, including "identity work," which connects to the self-concept in activist context; "identity convergence" with existing sociopolitical inclinations; and "identity construction," where interests of various individuals become aligned as a result of being part of an activist group. Digital media can be used to call attention to activist issues and put it on the agenda of individuals from various backgrounds who might otherwise not have an opportunity to link up with social movements. In networked contexts, the way that potential adherents get addressed and how they personally connect with activist agendas without feeling included becomes important.

### 3. Intersectionality and (Digital) Activism

FFF positions their activism as a global necessity, reframing the climate *change* narrative to alert the public about an imminent climate *crisis* that will affect everyone, everywhere. This message has universal appeal: It could, theoretically, mobilize any person with a sensibility toward environmental issues. As noted by Collins and Bilge (2020, p. XX), the histories of disenfranchisement in many global political movements connect to how individuals "see themselves as part of a broader transnational struggle." In social movement scholarship, the question of personal identification with a cause becomes important. In their early work, Klandermans and De Weerd (2000) discuss "social identity" as a factor for protest participation. A feminist reading of this conceptualization unveils that a monolithic understanding of social identity ignores how identity markers such as gender, race, or nationality mediate group cohesion and identification with a cause.

Movements consider their constituency in their issue framing and mobilization techniques. Skilled organizers should be aware that they engage with a diversity of individuals with varying backgrounds. Intersectionality sees the co-construction of identities as integral to understanding our social world, our experiences, and our convictions. Yet, feminist media scholars have critiqued a

lack of sensibility towards intersectionality by activist organizers, for instance in the 2017 Women's March in Washington, the Black Lives Matter movements, as well as digital empowerment campaigns like #MeToo (Jackson, 2016; C. Rose-Redwood & R. Rose-Redwood, 2017; Trott, 2020). Intersectional scrutiny calls out inclusivity in campaigns that are tied to both sociopolitical issues and specific identity markers, such as gender or race. In discussing FFF—and Thunberg specifically—Collins and Bilge (2020, p. XX) assert that intersectionality is key to understanding “youth activism in which digital and social media figure prominently.” Thus, an intersectional sensibility in activist engagement strategies is crucial. Roberts and Jesudason (2013, p. 313) study allyship between gender, race, and disability groups and argue that a focus on “movement intersectionality” fosters cohesion and solidarity across followers. This includes making adherents across causes feel included by acknowledging and validating identity-based lived experiences. For instance, FFF in Brazil was successful in linking up with indigenous groups by amplifying the violence of government extractivism and ethnic marginalization of their peoples. In including this perspective, indigenous activists such as Txai Suruí are now prominently featured as global, intersectional voices in the movement (Brooks, 2021).

While existing scholarship discusses Thunberg as a movement leader and central mobilizer for FFF's climate activism, scholars have not yet examined how FFF activists relate to Thunberg and how they network with her. An intersectional perspective to the popularity of Thunberg affords insight into the multilayered identifications protesters hold with both the cause and its mediated leader. Intersectionality here does not concern the diversity of the protesters themselves but rather seeks to point to various dimensions of Thunberg's mediated identity that become of importance to protesters. Studying these elements will bring nuance to simplified understandings of the prototypical young, female FFF activist who “receives social significance via their identifications with figures such as Greta Thunberg [or] Louisa Neubauer” (de Velasco, 2019). Building on leadership and identity formation literature in social movements, this study aims to bring nuance to the simplistic characterization of youth activists under the spell of the “Greta effect” by asking how activists identify with Thunberg, what role they assign her, and how they network around her digital communication.

#### 4. Method

To address networked mobilization and leadership identification in the FFF movement, this study builds on 19 walking interviews with students at the University Climate Strike Week at a university in Southern Germany in late autumn of 2019. I attended the climate breakfast in the student lounge on Tuesday morning. During this first event, I met two of the local FFF chapter adminis-

trators, Adrian and Katharina. I explained the nature of my research and asked them if they would encourage attendees to speak with me about their experiences with FFF. Seeing me converse with administrators prompted some students to inquire about my research, which led to some volunteering to be interviewed. Throughout the week, I went to different events, introducing myself to student activists and engaging in informal conversations about their journeys with FFF. At Friday's main strike event, 19 FFF followers agreed to be interviewed while marching for climate justice.

The interviewees included nine women (ages 16–24), eight men (ages 16–26), and two non-binary identifying individuals (ages 19 and 22). On average, participants have been involved with the FFF movement and the local chapter for six months. I also interviewed three students who attended an FFF event for the first time and three coordinators/administrators, who have each been with the local chapter since it was founded in 2018 (see Table 1). While the study participants are not particularly diverse in terms of their own sociodemographic makeup, they represent typical FFF strikers in Germany, where the majority of activists are higher educated and ethnically quite homogeneous. Though interviewees share much similarity with what the movement looks like across Western Europe, the data can only tell the story of these young climate activists in this particular context. Consequently, the study design does not hope to infer generalizability and while the sample is a good size, the stories do not account for FFF movement adherents at large.

Walking interviews are often used in urban geography scholarship (Evans & Jones, 2011) and have found application in other disciplines, where the atmosphere, surroundings, or specific location become important (O'Neill & Roberts, 2019). The walking takes the stringency out of the sit-down context and allows for a more natural conversation that can draw from the atmosphere. Given the activist occasion, the walking interview method enabled interviewees to embed their responses into storied contexts that provided insights into their ongoing engagements with the cause while feeding off the energy of like-minded bodies in the streets.

Each interview lasted around 20 minutes and was conducted using a loose interview protocol containing nine open-ended questions. The protocol included tour questions (“What motivated you to become involved in FFF?”), structural questions (“What role does Greta's gender as a female activist play for you personally?”), and devils-advocate questions (“Following Greta on Instagram is not really knowing the real person—how does interacting with her online connect you to her?”). These different question types (based on Lindlof & Taylor, 2017) allow interviewers to ask both open-ended and more targeted questions on particular experiences or attitudes. Overall, the protocol was designed to generate personal stories about the intersectional dimensions of their own protest mobilization. Specific questions



**Table 1.** Overview of study participants.

Pseudonym	Age	Gender	Student (Major)	Time Involved in FFF
1. Adrian	18	Male	High school	15 months (administrator)
2. Anna	20	Female	University (geography)	10 months
3. Carsten	21	Male	University (biology)	6 months
4. Christine	18	Female	High school	12 months
5. Daniel	16	Male	High school	6 months
6. Denise	24	Female	University (accounting)	7 months
7. Fred	26	Male	University (geography)	2 months
8. Jana	17	Female	High school	First time attending
9. Jonas	23	Male	University (physics)	4 months
10. Katharina	20	Female	University (political science)	15 months (administrator)
11. Lisa	16	Female	High school	First time attending
12. Loris	24	Male	University (German)	2 months
13. Luca	19	Non-Binary	University (sociology)	First time attending
14. Marie	21	Female	University (medicine)	11 months
15. Matthias	17	Male	High school	9 months
16. Nadine	18	Female	University (geoecology)	4 months
17. Sascha	22	Non-Binary	University (education)	8 months
18. Sven	25	Male	University (geography)	15 months (administrator)
19. Theresa	19	Female	University (English)	7 months

also targeted the use of social media to keep up with the movement and the role of Thunberg as FFF’s central figure.

The conversations with interviewees centered Thunberg as a motivator for participation, with particular attention paid to Thunberg’s identity markers (age, gender, race, class, and disability). Thunberg’s use of social media to provide direction for the movement and mobilize for action was discussed in relation to her digital networking practices alongside her mediation in print, broadcasting, and social media. Upon verbatim transcription, the interview data were imported into the qualitative data analysis software MAXQDA. Via two rounds of inductive coding, key statements were extracted and clustered to form six codes (gender, race, class, age, dis/ability, network practices) and further abstracted into three larger categories (see also Kuckartz & Rädiker, 2019). This process generated the three key themes that dovetail with the study’s three central research questions—Greta as a mobilizer, identifying with Greta, and networking with Greta.

## 5. Findings and Discussion

The University Climate Strike Week was designed to bring together students, academics, and members of the local community. The four-day program featured open discussions about climate justice, a feminist roundtable on reproductive rights as it connects to environmental justice, a workshop on climate communication, a practical unit on planting, a documentary screening, and a sustainability lecture—to name a few. Next to daily events, the action week culminated into the Global Day of Climate Action on Friday, with a large strike through

the downtown area, drawing 7,000 strikers. The events were advertised on the local FFF website and across regional social media accounts (Facebook, Instagram, and Twitter).

### 5.1. Greta as a Mobilizer

During the tour question period, which sought to generate a story about the interviewees’ personal mobilization experiences, three individuals specifically mentioned Greta Thunberg as a reason for joining the cause. Adrian, an 18-year-old high school student who has been involved in the local chapter for 12 months explains:

I knew a few students from my school who went to FFF meetings here on campus. I was intrigued, I mean, I feel passionate about the environment....I kept reading about Greta Thunberg and how she is telling politicians what they do not want to hear. That was also a push and I said: “Okay, this week, I am going to the FFF meeting.”

Since then, Adrian has evolved to becoming a local administrator, organizing strikes and events, such as the University Climate Strike Week. He notes: “We try to offer something for everyone—lectures by experts, a climate breakfast—and for those who cannot attend in person, we live stream to Instagram.”

Anna, a 20-year-old geography major reacted defensively when I asked about Thunberg, telling me that the “issues of the movement are bigger than one person.” Three more female activists proceeded to actively downplay Thunberg’s role for FFF. Nadine explains: “We don’t need Greta or anyone else at the top to tell us that the

climate crisis is here.” Jana notes: “We owe her, yes, but now FFF is everywhere and all of us count just as much.” Sven echoes this in explaining how the local chapter is organized: “We do not have a formal leader even in our organizational team. Here, we like that everyone can say what they think, and everyone can make decisions equally.”

With this assessment, the protesters seem to latch on to FFF’s public image of a transnational, grassroots, and—for the most part—“leaderless” movement (see also Gold, 2020). However, when pressed on the issue with follow-up questions such as “How do you think the movement would develop if Greta Thunberg stopped being involved?,” all 19 interviewees credited her personally with the movement’s success in building such a large supporter base. This supports Sabherwal et al.’s (2021) findings that familiarity with Thunberg affects students’ desire to become involved with climate activism.

## 5.2. Identifying With Greta

At the Friday strike, many participants carried signs, a few even had a picture of Thunberg with her slogans such as “there is no planet B.” Thunberg has been able to mobilize global youth for climate activism, making age a key factor in FFF’s public image. While many university employees and townspeople also participated in the Global Day of Climate Action on this particular occasion, the strikers were predominantly students. To a certain degree—and in this specific context—this contrasts Sabherwal et al.’s (2021, p. 329) findings that “familiarity with Greta Thunberg did not affect younger and older adults differently.” In asking what role Thunberg’s age played in public discourse, Daniel, a high school student who has been involved with FFF since the spring explains his frustration: “Greta is young, yes, but...that doesn’t mean she doesn’t know what she is talking about. We [youth] are constantly underestimated.” Similarly, Lisa, who goes to the same school as Daniel and marches for the first time explains: “Just look around...Young people everywhere. We know what’s at stake and we are here to say ‘do something!’” Daniel’s response dovetails with studies about journalistic treatments of protesters, in which they are downplayed, disparaged, and trivialized due to their age (Bergmann & Ossewaarde, 2020; von Zabern & Tulloch, 2021).

When asked about Greta’s identity as a young female, other females and one non-binary student were quicker to discard gender as a mobilizing factor. Christine, a high school student explains her feelings around gender norms: “I think it’s expected of girls to have an idol or someone to look up to, so for me, I don’t think it matters that she is a girl.” Theresa elaborates correspondingly:

Look, I am all for diversity in all areas. I am really pro-woman, women standing up is great because they were not allowed to do this for such a long time, yeah but for me, I don’t care that she’s female.

Indeed, Hayes and O’Neill (2021) have found that in media reporting of climate protest events, journalists mostly feature young, female FFF protesters. When I pointed to this rather feminized public image of the movement—with many mediatized national leadership figures being female—most female study participants did admit that they might not have participated to the same degree if the “face” of the movement was male. Indeed, male study participants were more likely to highlight Thunberg’s gender, arguing that it is important to support female political leadership. Fred, who has been involved with the local chapter for about two months responds energetically: “I find it extremely important that Greta is a girl, it sets an important counterpoint to how politics has been done up to this point!”

When asked what aspects of Thunberg’s identity participants personally identify with, it is not gender but rather elements pertaining to class that get highlighted. Sascha explains: “She is not a celebrity or one of those rich people suddenly interested in climate. She is a girl who was tired of waiting around for others to do something.” Jonas also notes that “the fact that she is middle-class is part of the narrative,” and Carsten elaborates:

Personally, I think she got famous because her protest was so simple, it was a normal girl from a pretty...average family...with no activist network or money just doing what she believed was right, she is like one of us, this resonates with our students here, I mean, locally—it’s an international story, Greta is a citizen representing our class and the message is global.

Protesters are often fascinated that Thunberg was able to pull off such a large-scale campaign without excessive financial resources, highlighting her class background. It is precisely by bringing together environmental issues with social equality demands that builds the environmental justice movement—and class is an important layer of identification with this master frame (Cutter, 1995). In terms of “identity construction” (Snow & McAdam, 2000), Thunberg’s class-standing resonates strongly with the local FFF community; although there is less difference to bridge (Carillo-Rowe, 2008) since university students in the Global North share proximity to her own middle-class.

While media reporting hails female participation, Thunberg’s disability is a much-contested element of news media reporting (Ryalls & Mazzarella, 2021; von Zabern & Tulloch, 2021). Participants in this study noted across the board that they take note of her different communication style but disagree with naming it a “drawback” for the movement. Rather, they understand her disability as a factor that gives Thunberg an “edge” (Marie), something that is needed to generate attention for FFF and the cause. Luca explains:

Well, I don't know what it's called but I—you saw it in that “how dare you” speech....I mean, that seemed almost like an outburst....In the media, it gives her something special and the media always need something special to report about it.

Denise similarly notes: “I mean, it is a good story, right [chuckles]. The kid with Asperger’s saving the planet.” Matthias recalls a tweet by Thunberg (2019), in which she explains how her condition is her “superpower”:

When haters go after your looks and differences, it means they have nowhere left to go. And then you know you're winning! I have Aspergers [sic] and that means I'm sometimes a bit different from the norm. And—given the right circumstances—being different is a superpower. #aspiepower

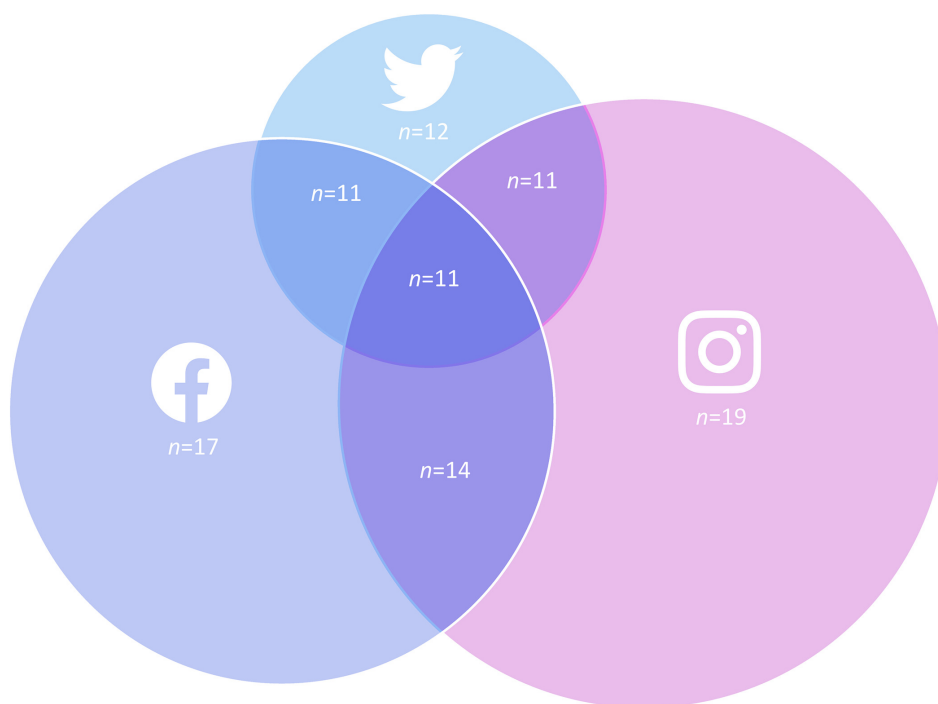
The insights provided by interviewees support the notion that Thunberg’s disability makes her exceptional in the minds of followers—it is not a deficit but rather, an advantage (see also Ryalls & Mazarella, 2021).

However, study participants seemed acutely unaware of the privilege that comes with Thunberg’s whiteness and how this aspect of her identity provides advantages. To that end, Ryalls and Mazarella (2021, p. 444) argue that “Thunberg’s whiteness marks her as idealized and exceptional, as the icon of the global climate change movement.” In the context of protest participation, C. Rose-Redwood and R. Rose-Redwood (2017, p. 654) argue that “whiteness often serves as the unspoken norm that goes unnoticed by those who benefit the most from white privilege.”

### 5.3. Networking With Greta

As we marched from the train station along the main campus roads and back towards the town square, I observed many strikers take pictures and videos of the protest march, immediately sharing them to social media. Among the 19 study participants, every single interviewee follows Greta Thunberg on at least one social media channel. Figure 1 details the social media reported by the interviewees: eight interviewees engaged with her content across all three platforms while 11 followed her both on Instagram and Facebook. When asked if strikers engaged with Thunberg’s social media communication (including liking, sharing, or commenting on status updates, pictures, videos, shared articles, etc.), Loris illustrates: “I like her posts because she has a way of putting things that really makes you think ‘This is urgent, the climate crisis is happening now.’” This testimony relates closely to Hwang and Kim’s (2015) findings that social media engagement promotes the intent to participate in social movements, highlighting the core role of networked communication practices in contemporary social movements.

In mentioning Thunberg’s popular tweet in which she calls her disability a “superpower,” Matthias explains that he recalls seeing it featured on the local collective’s page. The tweet’s metrics yield that it was prominently shared by FFF followers worldwide, suggesting that Thunberg’s disability is not only tolerated but amplified and instrumentalized to boost movement publicity. This underscores Boulianne et al.’s (2020, p. 216) observation that Thunberg’s messages on Twitter “were widely circulated, liked, and commented upon.”



**Figure 1.** What social media platform do you follow Greta Thunberg on (Instagram, Facebook, Twitter)?

Two of the local administrators point out that they often share posts by the national collective (FFF Germany) and Thunberg. Sven recalls: “We do share Greta’s posts...well, most of them, actually [laughter].” Katharina comments that they “sometimes tag” Thunberg, though she is aware that she probably will not see their post in her daily sea of mentions. They do so, she elaborates, to connect to local events or find “good quotes” to use in their online graphics. Here, organizers explain that local FFF chapters capitalize on Thunberg’s sociometric impact—a term that refers to the “high social capital and connectedness of the people who emerge as network movement leaders” (Bakardjieva et al., 2018, p. 908). Perhaps this networking practice makes local FFF chapters what Isa and Himmelboim (2018, p. 3) call “non-elite actors,” with the potential to become important social mediators in the overall digital FFF network.

Indeed, Sorce and Dumitrica (2021, p. 8) assert that Thunberg’s posts act as a “central discursive driver” for the movement, crediting her with developing keyframes, messages, and slogans that get picked up across FFF collectives in Europe. In that sense, networking with Thunberg creates an increased sense of collective identity through “affordances for discourse” (Khazraee & Novak, 2018), in which followers (individuals or groups) can co-perform her messages and share their own stories alongside Thunberg’s topic prompts. Taken together, the charted networking practices echo Olesen’s (2020) argument that followers use platform affordances such as commenting and sharing to connect their own activism to the cause and feel even more connected with Thunberg—a quintessential quality of networking in social movements that moves beyond the oft-critiqued passive post-reception and duplication.

## 6. Conclusion

This study sought to provide insights into how FFF activists gauge Thunberg’s role in FFF, how they connect with her identity, and how they interact with her online. Adherents in the FFF movement credit Thunberg with creating a movement that allows them to become politically active and take charge of their futures. While journalists overemphasize female participation in FFF, the interviews yield that female strikers are often more critical of Thunberg’s central role. In discussing Greta as a mobilizer, interviewees were reluctant to name her the movement’s leader, some even downplayed her as a mobilizing factor altogether—although, when asked more closely, the majority credits Thunberg as a central figure in the transnational youth climate scene. Gold (2020) reflects this assumed leaderlessness in her study of youth climate activists. In digital social movements, online followers often subscribe to a leaderless movement that is organized horizontally (Bennett & Segerberg, 2013) in which they can become “enthusiastic networked individuals” (Castells, 2012, p. 219) without taking direction from arrowheads.

While strikers downplay Thunberg’s leadership role, they all follow her social media communication on at least one platform. Followers keep up with Thunberg through her own networked communication practices on social media platforms, in reading about her in journalistic texts, or by watching videos about her. The networking patterns of social interaction with Thunberg by study participants moves beyond what Gerbaudo (2012) terms “soft leadership” in (online) social movements and more towards what Della Ratta and Valeriani (2014) posit as “connective leadership.” The practice of FFF organizers to retweet or share Thunberg’s post or tag her in local events and announcements supports the idea that her mobilizing power is being harnessed to push the movement’s online visibility. Yet, in the specific cultural context of this study (Germany), face-to-face interactions remain crucial in the maintenance of a collective identity and fostering identification with the cause.

Intersectional frameworks are present “in the discourses of self-identification among protesters” (Collins & Bilge, 2020, p. 166), and this becomes clear in participants’ stories about what elements of Thunberg’s identity they connect to. While FFF routinely performs intersectional awareness (Sorce & Dumitrica, 2021), the backgrounds of study participants suggest that—in the German context—the follower base remains quite monolithic. Individuals with migration backgrounds or non-European ethnicities remain conspicuously absent from the local FFF group. Interviewees were all white, highly educated, and from middle-class backgrounds. Perhaps this explains why participants valued Thunberg’s own class-standing to such an extent.

In providing qualitative insights from walking interview data, the study is able to offer a closer look at the motivations of individuals to join a movement based on a mediated leadership figure. Theoretically, the findings point to the key role of leadership in decentralized transnational movements, underscoring the value core figures such as Thunberg bring to popularizing and propelling a social movement cause. At the same time, the findings challenge notions of FFF as a feminized social movement by including additional perspectives of how movement adherents identify with the intersectional identity of leaders such as Thunberg. In addition, the article provides evidence on the importance of digital communication and online networks for FFF as social media has become a key channel for organizers to spread movement messages and conversely, for followers to keep up with movement developments. While the research was conducted before the start of the Covid-19 pandemic, the subsequent forced digitalization of FFF’s strike events during governmental lockdowns across Europe further cements the key role of online networks in social movements (Sorce & Dumitrica, 2021).

In line with qualitative epistemology—and to reflect on my own stance in the research process—it is worthwhile to note that my sensibility towards feminist ideals, intersectional inclusivity, and environmental concerns

has certainly shaped the topic selection, methodological choices, and reading of the research material. While this perspective has afforded valuable insights into movement mobilization around collective identity formation and leadership identification, three limitations of this study include the particular geographical and cultural context, smaller sample size, and brevity of the walking interviews. The generated insights can nuance assumptions about the “Greta effect” but cannot capture the intricacies of collective identity in the larger FFF movement (see also Fominaya, 2010). Additional in-depth conversations or even an ethnographic approach to studying FFF collectives over a longer time span will benefit our current understandings of youth climate activism. For digital activism research in particular, the findings underscore the theoretical value of studying the imaginations of leadership and identity-based identification from the perspective of movement followers, an area that merits further exploration.

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### Conflict of Interests

The author declares no conflict of interests.

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Article

## A Systems Approach to Studying Online Communities

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### Abstract

Much early communication research was inspired by systems theory. This approach emphasizes that individuals and groups use communication to interact with and respond to their larger environment and attempts to outline the ways that different levels interact with each other (e.g., work groups within departments within firms). Many concepts from systems theory—such as emergence and feedback loops—have become integral parts of communication theories. However, until recently, quantitative researchers have struggled to apply a systems approach. Large-scale, multilevel trace data from online platforms combined with computational advances are enabling a turn back toward systems-inspired research. I outline four systems-based approaches that recent research uses to study online communities: community comparisons, individual trajectories, cross-level mechanisms, and simulating emergent behavior. I end with a discussion of the opportunities and challenges of systems-based research for quantitative communication scholars.

### Keywords

digital trace data; online communities; organizational communication; systems theory

### Issue

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### 1. Introduction

In the 1960s and 1970s, communication scholars were enthralled by systems theory. While much of scientific progress has advanced by taking a reductionist approach (Sawyer, 2005), systems theory promised a set of theoretical and methodological tools for understanding how interdependent parts communicating and responding to each other can create an emergent whole. Organizational communication scholars produced foundational works elucidating and expounding how systems theory applied to organizations and groups as “open systems” (Farace et al., 1977; Katz & Kahn, 1966; Rogers & Agarwala-Rogers, 1976).

However, quantitative systems-based approaches failed to live up to their promise. These approaches were hampered in large part by the difficulty of obtaining and analyzing appropriate data. Systems theory fell out of favor as organizational communication took an interpretive turn. Although it is rare for contemporary researchers to explicitly view their work in terms of systems theory, many qualitative and quantitative communication the-

ories and questions have been influenced by systems theory and are amenable to systems theory approaches (Contractor, 1994; Lai & Lin, 2017; Poole, 1997, 2014).

Many of the barriers that made systems theory research so difficult have been greatly reduced in online contexts. We have access to digital trace data of online communities and organizations, with rich, granular, longitudinal data from millions of individuals across thousands of online communities. We also have the computational capacity to store, analyze, and model this data. These advances provide a revolutionary opportunity for researchers. In this article, I identify exciting approaches that researchers have already begun to undertake and I argue that the time is ripe for empirical researchers to turn again to systems thinking, theorizing, and testing.

### 2. Background

#### 2.1. Systems Theory

Poole (2014, p. 50) defines a system as “a set of interdependent components that form an internally organized



whole that operates as one in relation to its environment and to other systems.” Unlike typical statistical approaches, which treat each unit of analysis as independent, systems theory focuses on understanding interdependence. Farace et al. (1977) argue that interdependence is a key feature of organizations, and they define it as “the interlocked, reciprocal, mutually influential relationships among the organization’s members” (Farace et al., 1977, p. 17). Early systems theorists hoped that systems theory could be a framework for describing all types of interacting, interdependent systems, from cells and organs to organizations and societies (Poole, 2014).

This focus on understanding interdependence spawned a number of approaches and theories, and it is more accurate to think of systems theory as a set of related theories and frameworks rather than as a single theory. In this section I review three concepts from systems theory that I believe are the most influential and generative for communication scholars: environments, feedback loops, and emergence. For each, I give an example or two of communication research that relates to the concept. Following this, I sketch a brief history of how systems theory has influenced communication research. More thorough treatments of systems theory and its relationship with organizational communication can be found in Lai and Lin (2017) and Poole (2014).

### 2.1.1. Environments

In systems theory, the environment includes everything outside of a system that is relevant to it (Poole, 2014). The system takes in information and inputs from its environment, which influence the system’s behavior. A system’s environment includes the interdependencies that the system has with other systems—for example, if a product development group is our focal system, the environment might include the product testing group that it relies on for feedback and information. The environment also includes other aspects of the world that are relevant to the functioning of the system, such as the amount of resources available, regulatory or technological constraints, and cultural contexts. Which aspects are considered part of the system and which are part of the environment depends on where the boundary is drawn around the system, a decision which is largely dependent on the research question (Farace et al., 1977).

Many communication researchers have recognized the importance of external environments on organizations. For example, building on new institutionalism (DiMaggio & Powell, 1983), Lammers and Barbour’s (2006) institutional theory of organizational communication outlines the ways that extra- or cross-organizational institutions like norms, beliefs, and routines not only influence communication within an organization but are sustained and reproduced through communication processes.

### 2.1.2. Feedback Loops

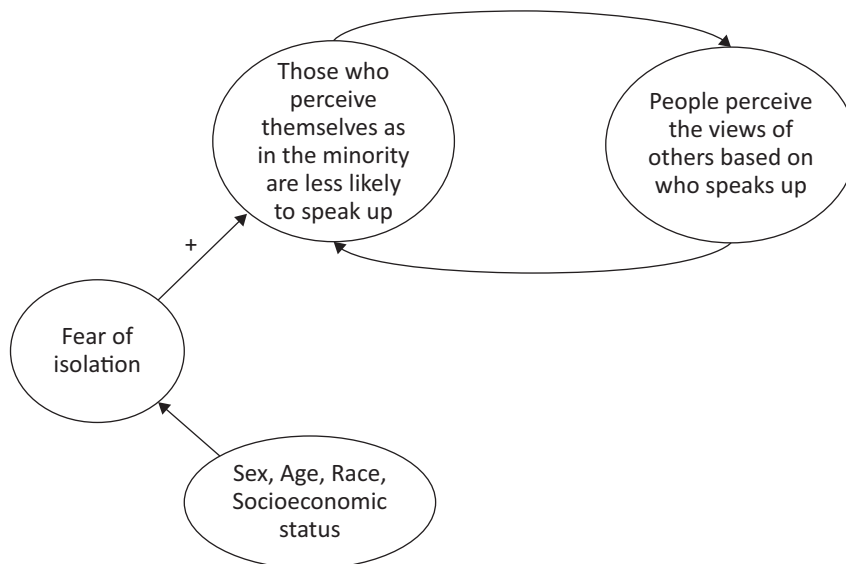
Feedback loops identify aspects of a system that are recursive/circular, leading to “mutual causality” (Contractor, 1994). In other words, the behavior of a system influences the environment and then the environment influences the behavior of the system. There are two primary types of feedback loops: Negative feedback loops are self-correcting, where a system responds to environmental changes so as to maintain homeostasis; positive feedback loops are self-amplifying, where the system amplifies environmental changes (Poole, 2014). The most influential treatment of feedback loops, called cybernetics, focused mostly on negative feedback loops (Wiener, 1948). Cybernetics posits that systems constantly gather feedback about the effects of their actions on their external environment and then adjust their actions in order to keep the system’s output in line with its goals. The canonical example of a simple cybernetic system is a thermostat.

Many organizational processes can also be conceptualized as feedback loops, although they will typically be much more complicated than a thermostat. For example, Figure 1 shows a simple version of the spiral of silence theory (Noelle-Neumann, 1974). In this model, people perceive the beliefs of those around them based on who is talking about their beliefs. Those who perceive their own opinions to be in the minority are then less likely to speak about them. This leads to a greater imbalance in who is speaking, and an even greater reluctance of those holding minority opinions to speak out. Thus, the spiral of silence is a positive feedback loop: The initial silence of minority believers begets more silence of minority believers until the only ones expressing opinions are all of one belief.

### 2.1.3. Emergence

Perhaps the key concept of systems theory is emergence. Emergence is colloquially captured in the adage “the whole is greater than the sum of its parts.” Emergence is the idea that, in many contexts, understanding the behavior of the individual components of a system is not enough to understand what will happen at a higher level—that higher-level behavior “emerges” from the interaction between components. In other words, through interaction and interdependence, a system can have different attributes and properties than its component parts (Poole, 2014). Individuals following even simple rules can produce surprisingly complex collective behavior (Sawyer, 2005). Examples commonly given are flocks of birds that appear to move as one organism or ants that build complicated structures and exhibit efficient, non-intuitive foraging strategies (Wilensky & Rand, 2015).

Many interpretive communication theories directly draw on the concept of emergence. Most notably, work on communication constitutes organizations (CCO) and



**Figure 1.** Representation of the spiral of silence theory as a positive feedback loop: Unless the fear of isolation is low, a group will enter a positive feedback loop, where those holding minority opinions are less and less likely to share them.

related theories of structuration are focused on how organization-level or group-level outcomes like norms, hierarchies, and meaning result from the communicative behavior of individual members (McPhee et al., 2014; Taylor & Van Every, 2000).

## 2.2. Systems Theory and Communication Theories

Systems theory was deeply influential for a generation of quantitative communication scholars. Despite the promise of these approaches, these early researchers suffered from two major hurdles: a lack of appropriate data and a lack of methodological tools. For many of the ideas from systems theory, data must be (a) granular, (b) longitudinal, and (c) include multiple subsystems/components. In typical work groups or firms, that makes data collection incredibly onerous and expensive.

Organizational communication researchers from this era often complained about the difficulty of collecting the necessary data to test theories about interacting systems. For example, Rogers and Agarwala-Rogers (1976) bemoaned the expense of time-series data, the difficulty of gathering longitudinal data unobtrusively, and the pressure to produce immediate results. Nearly a decade later, Monge et al. (1984) argued that organizational communication processes were well-theorized but not empirically validated in large part because of the difficulty of collecting and analyzing appropriate data.

The other major hurdle was a lack of methodological tools. These scholars had rich theories but could only approach them in fairly simple ways such as through surveys and simple regression models. Statistical tools that are valuable for studying complex systems like multi-level modeling, social network analysis, and causal inference had either not yet been developed or were in their infancy. These constraints led to empirical research

that was often cross-sectional, statistically simple, and could not test for interdependent processes like feedback loops (Contractor, 1994).

The weaknesses of this first wave of systems research made studying rich or complicated questions difficult, and communication scholars began to turn to interpretive and qualitative approaches in order to explore and explain richer concepts. While many of these qualitative researchers rightly criticized the simplified, reductionist approach taken by early quantitative researchers, many of their theories either explicitly or implicitly draw on systems theory.

Perhaps the best example is CCO research. In addition to the fundamental role of the concept of emergence as explained above, CCO researchers also analyze the role of environmental contexts in which organizations are embedded (Kuhn, 2008). Indeed, CCO scholars have explicitly argued that CCO has strong overlaps with systems theory and should draw more inspiration from systems theorists (Schoeneborn, 2011). Similarly, actor-network theory is fundamentally interested in the role of relationships and interdependence (Latour, 2007). In short, while traditional systems theorists have typically taken mathematical or quantitative approaches, qualitative and interpretive communication scholars have continued to engage with and develop systems theory concepts as metaphors and conceptual frameworks.

Outside of communication, systems theory continued to develop, primarily in STEM fields (for a summary see Sawyer, 2005). In the 1990s, a number of quantitative communication scholars introduced more recent developments in systems theory—such as self-organizing systems and chaos theory—and argued for their application to communication research (Contractor, 1994; Contractor & Seibold, 1993; Poole, 1997). Many of the methodological approaches they championed were not

adopted widely, likely because the statistical, computational, and data hurdles remained. However, these researchers did help spur the adoption of social network analysis, the systems theory method which remains most common today in quantitative communication research (Monge & Contractor, 2003).

In summary, organizational communication research has been deeply influenced by systems theory but, until recently, quantitative researchers in particular have struggled to study systems theory concepts like emergence, organizational-environmental interactions, and feedback loops. The rest of this article makes an argument for the promise of applying systems approaches to online communities and identifies a nascent turn in that direction.

### 2.3. Online Communities

Online communities refer to groups of people that form and organize online to meet collective goals. “Online communities” is an umbrella term that encompasses both commons-based peer production (Benkler, 2006)—such as Wikipedia and open-source software where participants produce a shared output—as well as discussion-based communities—such as Reddit, where the collective goal may be information-seeking or a sense of community (Hwang & Foote, 2021; Lampe et al., 2010).

Online communities number in the millions, with many millions of participants. While it is tempting to dismiss them as simple “bulletin boards” where information is posted and shared, they are complex organizations that can perform impressive tasks. For example, collaborative projects like Wikipedia, Linux, and Firefox successfully compete with products produced by some of the most well-resourced firms in the world.

While very small online communities behave differently than large communities (Hwang & Foote, 2021), structure and organization quickly appear as they grow. Researchers have shown that even moderately large online communities and peer production projects self-organize into a small core of dedicated contributors and a large periphery of occasional participants (Crowston et al., 2006; Matei & Britt, 2017). This surprising pattern occurs everywhere we look in online communities and looks very similar across communities (Broido & Clauset, 2019). For example, Figure 2 shows the distribution of comments per member in one hundred randomly selected Reddit subreddits; while there are small differences between communities, the overall shape of the distribution—with most people contributing very few comments while a few contribute many—is identical across every subreddit.

In some ways, online communities resemble voluntary organizations (Cress et al., 1997; McPherson, 1983): As in voluntary organizations, members are typically unpaid volunteers, without formal roles, who are free to participate in multiple organizations. However, there are differences that make the success of online communities even more surprising. Contributors are producing a pub-

lic information good (Fulk et al., 1996), typically having never met face-to-face and communicating only via text and the shared artifact (Bolici et al., 2016). Von Krogh and von Hippel (2006) argued that the success of online communities should cause us to question some of our assumptions about how groups and organizations work and that studying them would provide important insight not only into online communities, but into questions about motivation, self-organizing, and innovation in all types of organizations.

### 2.4. Online Communities as Systems

Organizational communication researchers and others have taken up this call and have worked to understand how online communities function. This work is broad and varied, including important work on how the technological features of online communities influence opportunities for collective action (Bimber et al., 2005, 2012; Fulk et al., 1996). Among many other findings, these researchers have identified three important aspects of online communities that make a systems approach vital for understanding them: (a) the role of platforms; (b) low barriers to entry, participation, and exit; and (c) fuzzy boundaries. Below I elaborate on each of these features and how they relate to systems theory.

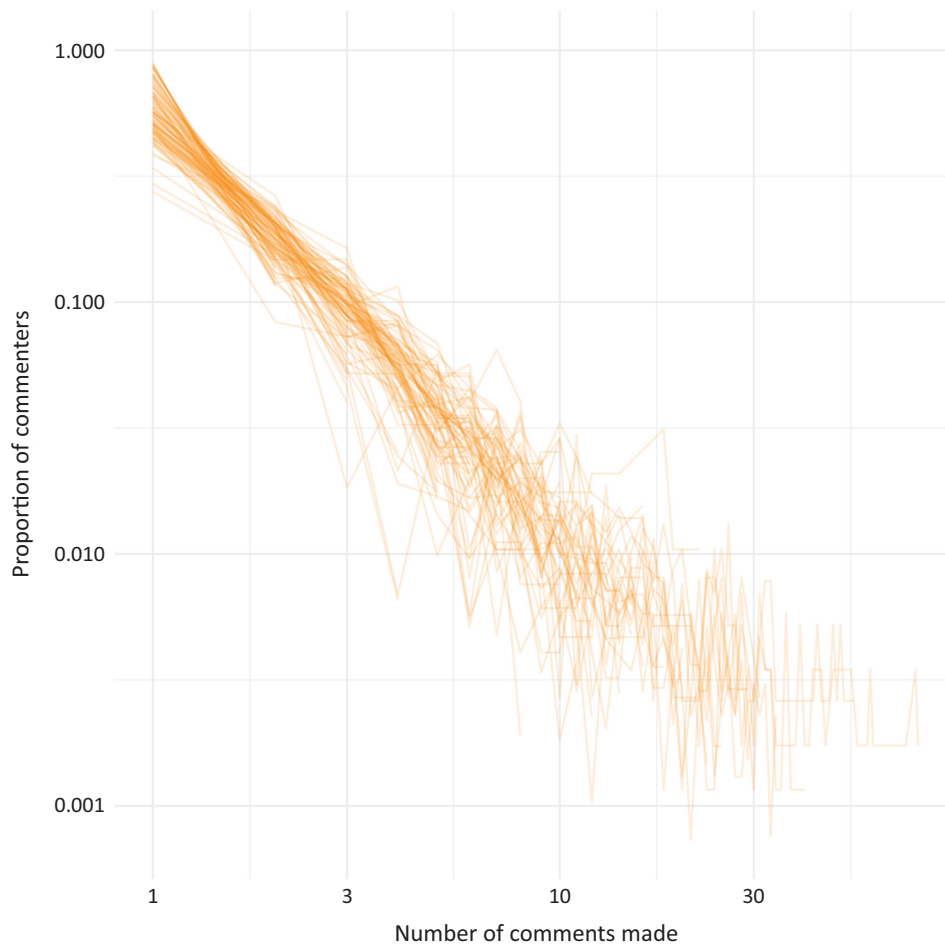
#### 2.4.1. The Role of Platforms

Many online communities exist on platforms, which they are only semi-independent of. Platforms often provide the technical infrastructure that an online community runs on, including software, servers, and internet connections. The goals and priorities of platforms are distinct from—and often at odds with—those of managers and members of online communities. Platforms can decide to do things like change the software, change the terms of service, or even ban online communities unilaterally; online communities have an ambivalent and complicated relationship with platforms. For example, subreddit moderators have protested platform decisions by doing things like “going dark”: stopping most people from accessing or contributing to their communities (Matias, 2016).

In systems terms, platforms often act as a changing environment that an individual online community system both reacts to and influences; in other words, platform-online community dynamics are complex feedback loops. Taking this perspective helps us to identify research opportunities—for example, we might hypothesize that a platform that begins to punish controversial online communities would spur those communities to retaliate, making platforms even more likely to crack down.

#### 2.4.2. Barriers to Entry, Participation, and Exit

Compared to offline organizations, the barriers to joining, contributing, and leaving an online group are incredibly



**Figure 2.** Distribution of comments per member across 100 randomly selected subreddits on Reddit in January 2017. Notes: The y-axis (log-scaled) shows the proportion of users making each number of comments (log-scaled); every community exhibits a very similar shape, with the lion’s share of commenters only making a few comments. Before plotting, the top 5% of participants were removed in order to remove the influence of highly active bots or incredibly active users and to highlight the similarity of “typical” users across these communities.

low. Typically, the median contributor makes only a few contributions. This has a number of implications. First, communities must be constantly engaged in welcoming and onboarding newcomers, a task that gets more difficult as a group grows in size and complexity (Halfaker et al., 2013; Narayan et al., 2017). On the other hand, organizations can benefit from low cost and low effort contributions that are enabled by information technologies (Bighash et al., 2018; Bimber et al., 2005).

Unlike employees, for whom changing jobs entails significant costs, online community participants can decide minute-by-minute whether, where, and how to contribute. Typical research on these barriers might focus on understanding how to change costs to encourage participation in a given online community. A study that takes a systems approach might look at how changing participation costs influences the entire ecosystem of communities. For example, we might ask not only whether disallowing anonymous contributors decreases contributions in a focal community, as Hill and Shaw (2021) do, but also whether it drives spammers and other

anonymous contributors to related communities.

#### 2.4.3. Fuzzy Boundaries

One result of the low barriers to participation in online communities is that defining group membership is very difficult. People quickly move between communities or contribute to multiple communities nearly simultaneously. At the community level, there are also fuzzy boundaries about what to consider an online community. For example, an open-source project may consist of multiple complex modules, or a wiki may cover distinct sets of topics. As a case in point, when researchers study Wikipedia, they may identify their focal community as the entire encyclopedia (Bryant et al., 2005), a single topical “project” (Qin et al., 2015), or even a single page (Brandes et al., 2009).

Even once we draw the borders around what constitutes a given community, online communities are often intimately connected. This can be implicit—like subreddits that focus on different aspects of the same

topic (TeBlunthuis et al., in press)—or explicit—like open-source software projects that are dependencies. A systems perspective can help us to recognize that this fuzziness is not a methodological hurdle to be overcome but a key lens for understanding the dynamics of online communities. For example, we can gain insight by looking at which communities people co-contribute to and how that changes over time (Xu, 2021; Zhu et al., 2014). These fuzzy boundaries mean that the environment has an outsized role; understanding why one online community succeeds in reaching its goals while another does not usually has much more to do with how and where the organization is embedded in the larger network (i.e., system) of online communities.

In sum, online communities and the individuals within them are interconnected, interdependent organizations with fuzzy boundaries that emerge from the nearly unconstrained choices of individuals: conditions that make systems approaches vital. Systems theory can help researchers to gain new insights into how to study and theorize about the behavior and dynamics of online communities.

### 3. A New Opportunity

Not only is a systems theory approach especially suitable for studying online communities, but two other factors make taking a systems theory approach feasible: (a) researchers have access to immense troves of data from online community platforms and (b) computational power, methods, and interfaces have each improved to an extent that doing systems research is tractable for social scientists.

#### 3.1. Data on Online Communities

Platforms like Reddit, GitHub, StackOverflow, and Wikipedia make an incredible wealth of data available to researchers. As part of their normal operations, these platforms track the actions that users take—such as editing pages, submitting code, or posting comments—with timestamps down to the millisecond. The opportunity provided by this “digital trace data” has been long recognized (Freelon, 2014) and communication research that uses digital trace data is increasingly common. While this data is useful for studying many communication questions, digital trace data is particularly appropriate for systems theory approaches. As explained by Rogers and Agarwala-Rogers (1976), the ideal data for systems research is longitudinal, unobtrusive, and includes many different organizations.

Indeed, data from online platforms is beyond what early researchers could even have hoped for. Often, today’s researchers have access not only to what actions people take in online communities but to the full text of the communication and conversations that happen across entire platforms. These platforms consist of many different communities—sometimes thousands or hun-

dreds of thousands—and may track millions of individual users as they interact within and move between online communities over time.

#### 3.2. Advances in Computational Resources

In addition to ideal data for taking a systems theory lens, there have been a number of recent advances in computational resources which make this kind of work simpler to do and more valuable. The first is straightforward: computers have become much more powerful in the last few decades. Both in terms of processing power and the cost of storage and memory, modern personal computers now have the capability to run impressive, moderately large-scale analyses. This has been accompanied by advances in distributed computing such as Apache Spark, which makes analyzing even very large datasets tractable.

The second advance is in software and statistical approaches for doing large-scale and cross-community work. This includes approaches like multilevel modeling in statistics, computational text analysis tools like topic modeling and sentiment analysis (Boumans & Trilling, 2016; Jacobi et al., 2016), event-based network analysis techniques like relational event modeling and processual communication networks (Pilny et al., 2020; Schecter et al., 2018), and agent-based modeling and other simulation-based analyses (Waldherr et al., 2021), an advance discussed in more detail below.

### 4. Approaches

Due to these data and computational advances, quantitative organizational communication scholars have the opportunity to study the behavior of online communities and platforms as systems. The kind of systems thinking that I am proposing orients researchers to questions about things like the role of the environment, the way that systems and subsystems interact across and within different levels, and the way that feedback loops influence communities.

I believe that this type of thinking has the potential to generate exciting new research in many directions. Indeed, scholars in communication and related disciplines have already been taking advantage of the data afforded by online platforms (Lazer et al., 2009). Some of this research addresses systems theory questions. Below I describe four of the most promising approaches and give examples of recent work in communication or adjacent fields that take each approach. As an example of how generative systems thinking can be, I also provide provocations about related studies that communication researchers might consider.

#### 4.1. Community Comparisons and Interactions

One approach enabled by rich online community data is simply to compare many online communities. One of the



weaknesses of organizational communication research is the difficulty and expense of studying even one organization in depth. Computational approaches are often very scalable—in many cases, it is nearly as easy to apply an analysis to one hundred or one thousand online communities as it is to apply it to one. One of the benefits is that large-scale comparisons allow for much stronger arguments about the generalizability of findings (Hill & Shaw, 2019). For example, Halfaker et al. (2013) identified a decline in users on English Wikipedia, positing that changes to technology and norms drove away newcomers. TeBlunthuis et al. (2018) showed that this same pattern of “rise and decline” was typical of hundreds of wikis, arguing that this pattern may be common to all online communities and calling into question the hypothesis that specific decisions made by Wikipedia were behind the drop in participation. Another benefit of studying many organizations is having the statistical power to study organization-level variables (Hill & Shaw, 2019). This allows researchers to look at things like how differences in communication structure relate to organizational outcomes (Crowston et al., 2006; Hinds & Lee, 2009; Schweik & English, 2012).

While comparing many communities can be incredibly powerful, it ignores relationships between communities. While this may be justifiable for many research questions, systems theory teaches us that for many outcomes it is important to study the way that organizations interact with each other. A growing number of communication scholars have been using a descendant of systems theory called organizational ecology to study offline organizations and online communities (Hannan & Freeman, 1977; Xu et al., 2021). The key idea of organizational ecology is that ecological relationships like competition and mutualism occur between organizations. For example, researchers have studied how topical competition influences membership (TeBlunthuis et al., 2017; Zhu et al., 2014) and how relationships between generalist and specialist social networking sites change over time (Xu, 2021).

There are exciting opportunities to extend this idea to incorporate and develop communication theories. If organizational ecology can tell us which online communities are undergoing competition, for example, then we might hypothesize that online communities undergoing intense competition would develop stronger organizational culture or identity due to the salience of other “outgroups” (Turner & Tajfel, 1986). Using a platform like GitHub, we could look for linguistic markers of group identity and examine how their prevalence changes at different levels of competition.

#### 4.2. Individual Trajectories

The second approach treats the individual rather than the organization as the focal system. Online platform data often allows researchers to track individual users as they join, participate in, and leave communities. This data lets us study how communities influence people

(and vice versa), how people decide where to participate, and which people are most likely to join or leave. Researchers studying individual trajectories have looked at things like the differences between typical Wikipedia newcomers and those who go on to become core contributors (Panciera et al., 2009) or how users adapt (or don’t) to the linguistic norms of the communities they join (Danescu-Niculescu-Mizil et al., 2013). A related approach is more granular: Instead of trying to understand long-term changes to users, it uses log data to explore how one individual’s actions influence others or how an individual moves through a platform in the course of a single session (e.g., Suthers, 2015).

Future research in this vein could draw more directly on both systems theory and communication theory. One key question from systems theory is how higher-level phenomena like organizations emerge from individual decisions. Individual trajectories could be used to empirically test aspects of communication theories that propose the importance of individual actions in creating or reproducing organizations. For example, researchers interested in CCO might look for ways that new community members learn about the texts of a community and how the content or patterns of their communication differs after being exposed to those texts.

#### 4.3. Cross-Level Mechanisms

The third approach focuses on what I call cross-level mechanisms. The papers in this area look at how organization-level or platform-level decisions influence an organization or set of organizations and then look at individual-level data to understand the underlying mechanisms. For example, Nagaraj and Piezunka (2020) study how contributions to the open-source mapping system OpenStreetMap in a given country change following the entry of Google Maps as a competitor. Their initial analysis shows that competition reduces the number of contributions to OpenStreetMap. This is an important finding, but having individual-level data allows Nagaraj and Piezunka (2020) to go further, showing that this effect is driven completely by a reduction in new contributors while existing contributors actually contribute more when competition increases.

Chandrasekharan et al. (2017) take a similar approach. In their initial analysis, they show that when Reddit banned a number of toxic subreddits this did not cause an increase in the amount of hate speech used in adjacent communities. Their individual-level analysis shows that this was due both to users leaving Reddit and also because those users who stayed reduced their use of hate speech.

Communication scholars are often interested in cross-level dynamics. For example, organizational scholars might be interested in how different leaders in an online community influence both organizational-level measures of productivity or retention as well as the individual-level drivers of those measures. In order to

study these questions, a researcher could look at how adding a new moderator to a Reddit subreddit changes online community-level measures like the number of participants and could then drill down to look for things like linguistic markers of discontent.

#### 4.4. Simulating Emergent Behavior

The fourth approach does not depend on having digital trace data at all. Communication researchers have begun to use simulation—in the form of agent-based modeling—to model how higher-level behavior can emerge from interactions. In agent-based modeling, a researcher creates a simulated society, peopled by computational “agents.” Agents are simple computer programs that take in input about their environment and make decisions. Agent-based models (ABMs) are ideal for modeling system behavior because they are designed to capture feedback loops and emergence (Sawyer, 2005). While earlier software like cellular automata (Wolfram, 1984) was incredibly simple due to a lack of computational power, modern software like Mesa (Kazil et al., 2020) or NetLogo (Wilensky, 1999) makes it possible to create much more complex and realistic agents and environments.

Waldherr et al. (2021) argue that greater adoption of ABMs would benefit communication research for many reasons, including formalization, explanation, and exploration. Formalization refers to the benefits that come from explicitly encoding a theory’s predictions into computer code. Waldherr et al. (2021) argue that this can help to identify ambiguities and blind spots in theories. Explanation refers to how ABMs can be used to test communication theories. Many theories make predictions about how individual-level behavior produces higher-level patterns. If agents acting according to those theories do not produce those patterns, then we know that something about the theory (or its computational representation) is wrong. Exploration refers to using ABMs for theory generation and as tools for thinking (Wilensky & Rand, 2015). ABMs can be used as digital laboratories, testing how agents behave in different contexts; interesting or surprising behavior can then be tested empirically.

Because they don’t rely on large-scale data, ABMs can be used outside of the context of online communities. ABMs are an increasingly popular tool for communication scholars across interest areas. For example, a recent special issue in *Communication Methods and Measures* featured ABMs which explored how memory relates to linguistic redundancy (Oh & Kim, 2021), how group decision making can be improved by having opposing factions (Shugars, 2021), how information spreads in an information-seeking context (Reynolds, 2021), and how friendship influences and is influenced by media use (Friemel, 2021).

Many other communication theories could be explored using ABMs. To return to our spiral of silence

example, researchers have used ABMs to explore questions like how the impact of the spiral of silence mechanisms differs depending on the size of a communication network (Sohn, 2019) or if manipulative bots are added to the network (Ross et al., 2019).

## 5. Discussion

Communication theories developed by qualitative and interpretive researchers are often about interdependent, embedded, recursive processes. The methods and conceptual advances of systems theory provide an exciting means to both test existing theories and develop new extensions. I have focused on the context of online communities as a starting point, but there is an argument to be made for the necessity and promise of taking a systems approach more broadly. While it may have made sense at one point to study only a group’s offline communication patterns, contemporary communication processes now span multiple media, and the separation between online and offline and work and home are increasingly blurry. Communication research needs to consider the role of these changes, and systems thinking is vital for theorizing about our new interdependencies.

While the focus of this article has been on how new data and methods empower quantitative researchers of online communities, many of the systems-inspired research ideas that I propose above could be studied qualitatively, and qualitative researchers may also find a systems perspective generative. Indeed, understanding systems well requires combining computational and qualitative approaches, and there have been some recent methodological advances in this area. For example, Nelson (2020) introduces “computational grounded theory,” an approach that goes back and forth between computational steps and interpretive steps to both gain a richer understanding of the computational output and to validate the qualitative findings.

Of course, no approach is perfect and systems theory and the approaches I have outlined have their own difficulties and drawbacks. Conceptually, one of the difficulties of systems theory is just how broad it is. By trying to abstract the concepts of interdependence across contexts, systems theory is somewhat unwieldy to try to “apply” to a given question or topic. Indeed, I have intentionally chosen a narrow set of concepts and approaches to focus on in this essay and have ignored others like chaos theory, equifinality, and autopoiesis (Poole, 2014) or cousins of systems theory like game theory, collective behavior, or evolutionary processes. I have chosen the concepts that I think are the most applicable and generative, but others would likely choose a different set of relevant concepts and approaches.

The second limitation is more practical. Many of the examples of work applying systems approaches to online communities cited above were published in computer science venues, and that is not coincidental. While there have been some noble attempts to make computational

analysis tools available to non-technical researchers (e.g., Hansen et al., 2010), in general some programming experience is required for any of the approaches discussed and the technical skill required to obtain, manage, and analyze large-scale data from online communities is still substantial.

However, there is a significant subset of this research that does not require large-scale computing resources or years of programming experience. Many programming libraries exist that make these approaches fairly straightforward. One or two semesters of programming instruction is sufficient to teach graduate students how to gather online data from APIs and conduct computational text analyses or how to create ABMs. For more complicated analyses, communication researchers can partner with computer scientists and there has been a growing movement from both fields to encourage these partnerships (Lazer et al., 2009).

## 6. Conclusion

We are entering a new era in organizational communication research. Online communities produce rich data at the level of individuals, organizations, and platforms. This data is already allowing us to answer new questions and gain new insight into communicative and organizing processes. Approaches like online organizational ecology, large-scale user trajectories, and agent-based modeling provide promising new avenues for developing and testing communication theories and for fulfilling the promise of systems theory that communication researchers recognized decades ago.

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## Conflict of Interests

The author declares no conflict of interests.

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Article

## Expertise, Knowledge, and Resilience in #AcademicTwitter: Enacting Resilience-Craft in a Community of Practice

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### Abstract

Online communities of practice are a useful professional development space, where members can exchange information, aggregate expertise, and find support. These communities have grown in popularity within higher education—especially on social networking sites like Twitter. Although popular within academe, less is known about how specific online communities of practice respond and adapt during times of crisis (e.g., building capacity for resilience). We examined 22,078 tweets from #AcademicTwitter during the first two months of the Covid-19 pandemic, which impacted higher education institutions greatly, to explore how #AcademicTwitter enacted resilience during this time. Using text mining and semantic network analysis, we highlight three specific communicative processes that constitute resilience through a form of resilience labor that we conceptualize as “resilience-craft.” Our findings provide theoretical significance by showing how resilience-craft can extend theorizing around both communities of practice and the communicative theory of resilience through a new form of resilience labor. We offer pragmatic implications given our findings that address how universities and colleges can act resiliently in the face of uncertainty.

### Keywords

#AcademicTwitter; communities of practice; Covid-19; hashtags; resilience; Twitter

### Issue

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### 1. Introduction

In Buzzanell’s (2010) International Communication Association presidential address, which outlined the communicative theory of resilience, she posed the following question: “How do people go on from day to day amidst...looming possibilities of pandemics?” (Buzzanell, 2010, p. 2). Given the (ongoing) disruption caused throughout college campuses by the Covid-19 pandemic, as educators moved their classes and teaching online, many college instructors expressed frustration, angst, anxiety, and stress (Kamenetz, 2020b). In response to these institutional and pedagogical disruptions, groups like Pandemic Pedagogy emerged on social media platforms, like Facebook, while others took to

Twitter using #AcademicTwitter to broadcast ideas, seek help, and offer social and technical support (Supiano, 2020). In short, these forms of ad hoc, hashtagged spaces were organized as online and spontaneous communities of practice (CoP). Using the CoP framework, this study examines tweets from #AcademicTwitter to understand the specific ways that academics organized an online CoP in response to Covid-19.

We focus attention on the organizing process of CoPs, recognizing how they provide an environment for constructing personal and professional identities through the sharing of personal histories, information exchange, and mentoring (Andrew et al., 2009). As CoPs engender a diverse mix of novices with experts, these communities provide a fruitful ground in which beginners can



learn the talk, walk, and work of a profession (Lave & Wenger, 1991). For example, Park and Schallert (2020) illustrate how participation in practice and research-oriented programs provides a process through which doctoral students build an emerging professional identity. Further, recent research has affirmed the importance of instructional communication during uncertainty and crisis (Edwards et al., 2021). Wenger (1998) provides a framework of three outcomes used to measure instructional communication with CoPs: mutual engagement, shared repertoire, and negotiation of shared goals. These three foci offer insight into the knowledge construction and learning activities of CoPs, as organizations aim to overcome crises and mitigate risk (Edwards et al., 2021). However, less research has explored how these processes may also enact resilience during a crisis. We give attention to one CoP, #AcademicTwitter, to explore how it organizes resilience. #AcademicTwitter is one of many communal spaces in academia aimed at building “community, [having] some fun, and [letting] off steam” (Wright, 2015, para. 2). #AcademicTwitter “is used to share information, provide support, and engage in conversations regarding the world of academia” (Gomez-Vasquez & Romero-Hall, 2020, p. 2). Given the immense disruption caused by Covid-19, the scope of content shared on #AcademicTwitter’s shifted to discuss the ongoing social, emotional, and work-related impacts of the pandemic throughout academia (Davies, 2021; Lobo, 2020). Given Buzzanell’s prescient question about how individuals continue to do work during times of crisis, our article explores how #AcademicTwitter constituted resilience as a communicative process that is leveraged during disruptions as individuals share and receive knowledge within CoPs.

Our article begins by providing an overview of scholarship related to CoPs. We privilege research on both knowledge sharing and online configurations of CoPs as a backdrop for our study. We then integrate the communicative theory of resilience as a theoretical lens through which we explore the context of our study, #AcademicTwitter. Next, we describe our data collection processes and analytical methods. From there, we describe three communicative processes utilized within #AcademicTwitter that enact resilience-craft within the #AcademicTwitter CoP. Finally, we conclude by discussing the implications of our study and situating resilience-craft within the CoP and resilience literature.

## 2. Literature Review

### 2.1. Communities of Practices and Knowledge Sharing

CoPs are self-governed, learning-based networks routinely oriented around professional development and knowledge sharing (Wenger, 1998; Wenger et al., 2002). Specifically, Wenger et al. (2002, p. 4) conceptualize CoPs as “groups of people who share a concern, a set of problems, or a passion about a topic, and who deepen their

knowledge and expertise in this area by interacting on an ongoing basis.” Yet, unlike formal organizations governed by defined rules and shared goals, CoPs develop socially through the mutual collaboration of practitioners and educators, novices, and experts (Lave & Wenger, 1991). Within CoPs, members gather to share resources and information, engage in joint activities and discussions, and contribute to collective expertise on the topic (Wenger, 1998).

Furthermore, in considering the specific goals and aims of CoPs, Hydle et al. (2014) distinguish between communities of tasks (e.g., formalized working groups, committees, or research teams) and communities of learning (e.g., mentoring programs, learning communities, or professional development communities). We give attention to communities of learning, which are organized through their knowledge creation and subsequent learning processes that socially construct normative values and identity in a practice environment. In a practice-based environment, the role of craft, or the ability to improvise and adjust through expertise and knowledge, becomes vital to cultivating expertise (Amin & Roberts, 2008). Despite these configurations of CoPs as high-impact learning collectives, Lindkvist (2005) argued that traditional studies of CoPs ignore temporal aspects of CoP organizing. Studies minimize the role of short-term and ad hoc CoP configurations, noting that “such temporary organizations or project groups within firms consist of people, most of whom have not met before, who have to engage in swift socialization and carry out a pre-specified task within set limits as to time and costs” (Lindkvist, 2005, p. 1190). To address this limitation, online and virtual CoPs are gaining scholarly attention for the ease and utility of creating collective spaces for individuals (see Greenhalgh et al., 2020; Kimble et al., 2001).

Regarding online CoPs, Gunawardena et al. (2009) offered a conceptual framework that incorporates the increased use of social networking tools in professional life into their constitution of CoPs. Their framework includes socially mediated metacognition, which refers to “the reciprocal process of exploring each other’s reasoning and viewpoints to construct a shared understanding” (Gunawardena et al., 2009, p. 14). Social media enable users to engage in metacognition using affordances, or how technical, social, or communicative features of media technologies allow people to engage with one another (Bucher & Helmond, 2018; Rice et al., 2017). Affordances (perceived or material) foster and promote certain communication types on social media platforms and are crucial in organizing CoPs. For our study, we focus on how the communicative affordances of hashtags create opportunities for online CoP organizing to occur.

CoPs also incorporate socio-material aspects that have both online and offline implications (Scott & Orlikowski, 2012). For example, Tewksbury (2013) illustrated how the Occupy Movement emerged synchronously online and offline, allowing members to



share strategies and knowledge to advance their participatory democratic ideals. Given the socio-material impact of online CoPs, we give attention to the use of hashtags on Twitter as a valuable and vital affordance in organizing CoPs online. Hashtags have been given increased attention for their utility in professional development in higher education. In their netnography of a college academic advising Twitter chat, Eaton and Pasquini (2020) called for increased focus on how and why certain types of knowledge sharing and organizing occurred in hashtag chat communities.

In our conceptualization of #AcademicTwitter as a CoP, we consider how “individuals realize collective challenges and opportunities associated with knowledge sharing across organizational boundaries” (Eaton & Pasquini, 2020, p. 2) through ad hoc, networked, and spontaneous practices. In this vein, we analyze how virtual engagement with #AcademicTwitter rendered socio-material consequences online and offline to adapt to changes generated by the Covid-19 pandemic. #AcademicTwitter convenes through a similar hashtagged community; however, we contend that a central component of the hashtag is the use of communicative resilience processes to provide a variety of support opportunities.

## 2.2. #Resilience and Crisis

To study the communicative enactment of resilience, we borrow from Richardson’s (2002, p. 309) definition of resilience as an ability of an individual or group to reintegrate “from disruptions in life.” Similarly, Buzzanell (2010) noted that resilience could be discursively rooted in how rituals, stories, and experiences communicatively constitute realities in dynamic and ever-changing ways (Buzzanell & Shenoy-Packer, 2015). Moreover, Buzzanell (2010, 2018) theorized resilience as a multi-level, adaptive-transformative communication process triggered by crisis and disruption, giving way to networked organizing. Lee et al. (2020) suggested that improvised networks can serve as a buffer against external threats and act as a resource for sharing new ideas and information. In this context, improvisation is not simply a facet of organizing but is the resilient process through which individuals engage. We, too, contend that networked resilience may be an important avenue through which ad hoc organizing occurs. A key consideration for this study is the role that communication networks play in fostering improvised resilience in a spontaneous CoP. Although Lee et al. (2020) examined improvised resilience in the context of disaster, we extend this line of theorizing by considering both the context of Covid-19 as a catalyst for ongoing disruptions wherein spontaneous and networked organizing through Twitter hashtags seemingly constitutes resilience online. As has been shown in recent research (Literat & Kligler-Vilenchik, 2021), social media participation can potentially improve wellbeing and resilience.

In recent years, the study of communicative resilience online has been given much attention, with scholars examining different facets of Buzzanell’s communicative theory of resilience. For instance, Eddington (2020) examined how members of an online men’s rights community utilized contradictory and alternative logic to (re)construct online and offline gender identities. Any cascading, multidimensional, and unexpected events can trigger resilience (Hintz et al., 2021). Trigger events, or turning points, can occur both as anticipated and unstable changes that are momentary or persistent. Further, research (Jarvis, 2021) illustrates the opportunities and advancements of information sharing and supportive communication to enhance collective resilience during prolonged periods of unease. In shifting focus to the communal knowledge enactments of #AcademicTwitter, we move to make evident the convergence of improvisation with expertise towards engendering resilience.

Given the enriched possibilities of resilience through expertise, we give specific attention to themes of resilient labor. Agarwal and Buzzanell (2015, p. 409) conceptualize resilience labor “as a dual-layered process of (re)integrating transformative identities and identifications to sustain and construct ongoing organizational involvement and resilience.” That is, resilience labor recognizes the influence of context and organizational site in sustaining workers, and their identities, in their organizational involvement (Ashcraft, 2007; Kuhn, 2006). Agarwal and Buzzanell (2015) identify ideological and organizational networks as critical to the substance of resilience labor in aligning identity/identification. Resilience labor is a materially discursive process crafted through creative adaptations and empowering logic brought on by the trigger event (Buzzanell et al., 1997), thus it is a particularly well-suited phenomenon on which to examine knowledge-sharing practices of a CoP. Additionally, Ford (2018) characterized resilience labor as a form of work that is in a constant state of resilience enactment; therefore, considering the networked, ongoing, and dynamic nature of Twitter (and #AcademicTwitter), we give attention to the various ways that #AcademicTwitter enable academics opportunities to constitute resilience.

## 2.3. The Great Covid-19 Migration and #AcademicTwitter

As Covid-19 wreaked havoc on public and private life, it so too quickly forced all industry sectors online. Educational institutions at varying levels were particularly hard hit as teachers and professors sought to adapt to the demands of e-learning, eventually leading the World Economic Forum to estimate that 1.2 billion children, across 186 countries, were out of the classroom (Li & Lalani, 2020). As instructors worldwide sought to mitigate the disruption to their planned curriculum, many turned to social networking platforms, like Twitter, to strategize and innovate design. Among these communities, #AcademicTwitter emerged as a prominent tool for

educators, professionals, and commentators to discuss accessibility, academic life, and teaching and research support (Gomez-Vasquez & Romero-Hall, 2020).

Our focus on #AcademicTwitter builds upon recent scholarship that has examined the hashtagged space through various communicative patterns and roles of users. For example, Gomez-Vasquez and Romero-Hall (2020) mapped conversational topics and constructed the social network of users to examine how resources (e.g., knowledge, advice, and information) moved throughout the network. Others have examined #AcademicTwitter as a means of feminist praxis and advocacy. Talbot and Pownall's (2022) thematic analysis of #AcademicTwitter characterized the space in conflicting terms: one organized through both (a) communality and support and (b) "promoting the competitiveness and overwork that pervades offline academic settings" (Talbot & Pownall, 2022, p. 113).

Recent scholarship by Davies (2021) studied #AcademicTwitter during the Covid-19 pandemic to shed light on how academics framed their work during the early days of the pandemic. In their study, Davies (2021, p. 9) identified "humor, articulations of care, and the crafting of communities" as "central to life and work in the academy during the pandemic," and called for additional scholarship that highlights "the tools and practices throughout which these are rendered meaningful and bearable." Responding to Davies' call, we ask the following research question: How did #AcademicTwitter enact resilience during the beginning of the Covid-19 pandemic?

### 3. Methods

#### 3.1. Data Collection

To study how improvised CoPs organize, we collected 22,078 tweets throughout March and early April 2020. We adopted a two-phase process. First, we used a Python library called GetOldTweets3 to collect all tweets that used #AcademicTwitter between March 9, 2020 (the day before Harvard University announced its closure) and April 4, 2020 (Henrique, 2018; Kamenetz, 2020a). GetOldTweets3 is commonly used in social scientific research and network analysis as it allows the researcher to enable a specific time interval (Zirbilek et al., 2021). Caitlyn Jarvis edited the existing code to retrieve the tweets that matched our search criteria, creating a query to collect all the tweets that used #AcademicTwitter between our designed dates. Second, we are utilizing text mining and semantic network analyses to explore the discursive and socio-material enactments of resilience in #AcademicTwitter to understand how the hashtag helped in constituting resilience.

#### 3.2. Data Analysis

We adopted a threefold process of analysis for the 22,078 tweets from #AcademicTwitter. First, the tweets

were analyzed using text mining, a computational social science methodology adept at identifying relationships between words and phrases in large, unstructured data sets (Ignatow & Mihalcea, 2018). Lambert (2017, p. 3) describes text mining as "one strategy for analyzing textual data archives that are too large to read and code by hand, and for identifying patterns within textual data that cannot be easily found using other methods." A key assumption of text mining is that meaning can be found from the analysis (and the frequencies) of words, phrases, and concepts into conceptual hierarchies (Jarvis & Eddington, 2020, 2021; Sowa, 1984). Meaning, as Leydesdorff and Welbers (2011, p. 474) contend, "is generated when different bits of information are related at the systems level, and thus positioned in a vector space." To conduct the text mining, we utilized the AutoMap software (Carley, 2001).

To begin text mining, we preprocessed all tweets. Preprocessing is a necessary step that creates a uniform text corpus by removing metadata and hyperlinks, creating synonyms of concepts (e.g., "covid," "COVID-19," and "coronavirus" were transformed to "covid19"). Once the text corpus was sufficiently cleaned, a co-occurrence list of semantic concepts was generated. The co-occurrence list is the basis for the semantic network analysis and contains pairs of words near one another. A fundamental assumption of this approach is that terms and concepts that are frequently close in proximity to one another contain meaning (Grimmer & Stewart, 2013). These procedures are the first step in creating a relational network of semantic content known as a semantic network. Within the context of this study, text mining offers insights into revealing potential relational networks of meaning that undergird individuals' enactment of resilience on #AcademicTwitter.

Once the text corpus was reasonably cleaned, AutoMap generated a co-occurrence list of pairs of words that frequently appear together in the text corpus. These word pairs (and their corresponding frequencies) are imported into network analysis software, NodeXL for analysis (Smith et al., 2010). In this instance, nodes represent the concepts (i.e., words or phrases) that appear within the text corpus of #AcademicTwitter. Edges represent the co-occurrence of concepts with one another, and their frequencies represent the strength of the ties. In other words, a thick edge between two concepts indicates that the words frequently appear together. Semantic network analysis can be useful in identifying central ideas and concepts that emerge within a network. Semantic networks also exhibit similar structures to social networks (Doerfel, 1998). As such, network analytics like cluster analyses can be applied to uncover conversational clusters—or themes—that appear within the semantic network. Clustering analyses are helpful in that they create "cliques" of word pairs that more frequently occur together, which demonstrate underlying group structures. Group structures can exhibit thematic qualities as they recur and revolve around central topics

or concepts; however, to interpret the clusters, we utilized thematic analyses to contextualize specific topics and concepts in the three largest clusters of the Twitter data (Eddington, 2020; Jarvis & Eddington, 2020).

Using the three largest clusters as a guide, we returned to original tweets to identify themes, or recurring and repeated meanings, embedded within our semantic networks (Eddington, 2020; Leydesdorff & Welbers, 2011). To understand the specific meanings conveyed by the clusters, Sean Eddington searched the text corpus for specific instances of central words and phrases identified within the cluster analyses. Next, Sean Eddington recorded the comments for central cluster nodes in a separate spreadsheet and used a constant comparative analysis to code them (Corbin & Strauss, 2015). After examining the semantic data in context, Sean Eddington engaged in open coding and then began to group the initial codes into broader categories. For example, codes related to “resources,” “suggestions,” and “advice” were grouped into the higher-level category “knowledge sharing.” This process occurred for each of the remaining clusters. Once initial themes were defined, Sean Eddington discussed the findings with Caitlyn Jarvis to ensure validity.

Our findings are discussed in the next section. In compliance with the 2019 Association of Internet Researchers’ Ethical Field Guidelines 3.0, tweets that are shared are both paraphrased and anonymized to address issues with risk and data anonymization (Franzke et al., 2019). Additionally, in the reporting of our findings, when discussing specific nodes in the quotes, we bold and place parentheses around the semantic connections (i.e., “pandemic—pedagogy”).

#### 4. Results

In responding to the research question, we identified three primary purposes of #AcademicTwitter that help to constitute resilience. First, the hashtagged space enabled users to engage in sensemaking about academics’ experiences at the onset of Covid-19. Second, #AcademicTwitter cultivated opportunities for knowledge-sharing. Third, #AcademicTwitter provided a space for social support for academics given the initial impact of Covid-19 on everyday lives. It is through the entanglement of these three communicative processes that resilience within #AcademicTwitter is constituted.

##### 4.1. Sensemaking

Sensemaking was the first way that #AcademicTwitter constituted resilience. Sensemaking, or the ability for individuals to retroactively define and understand their experiences, can often be triggered through crisis *and* is an ongoing process (Weick, 1995). As academics struggled to make sense of their disrupted realities, the quick transition online was a key focal point of the space. In Figure 1, the central (and largest) node in

the cluster was “online,” and many users discuss different experiences and perceptions of the transition to online teaching. Within the “online” cluster, nodes connected to “online” were nodes like “move\_course,” “shift,” “and “prepare.”

For many within the space, sharing their experiences and reflections regarding the “shift—online” was critical to story and understand their experience. As one user noted: “This is not a ‘shift—online’! Let’s call it what it really is: emergency education! #AcademicTwitter.” Others lamented the impact of the shift online. Another user reflected:

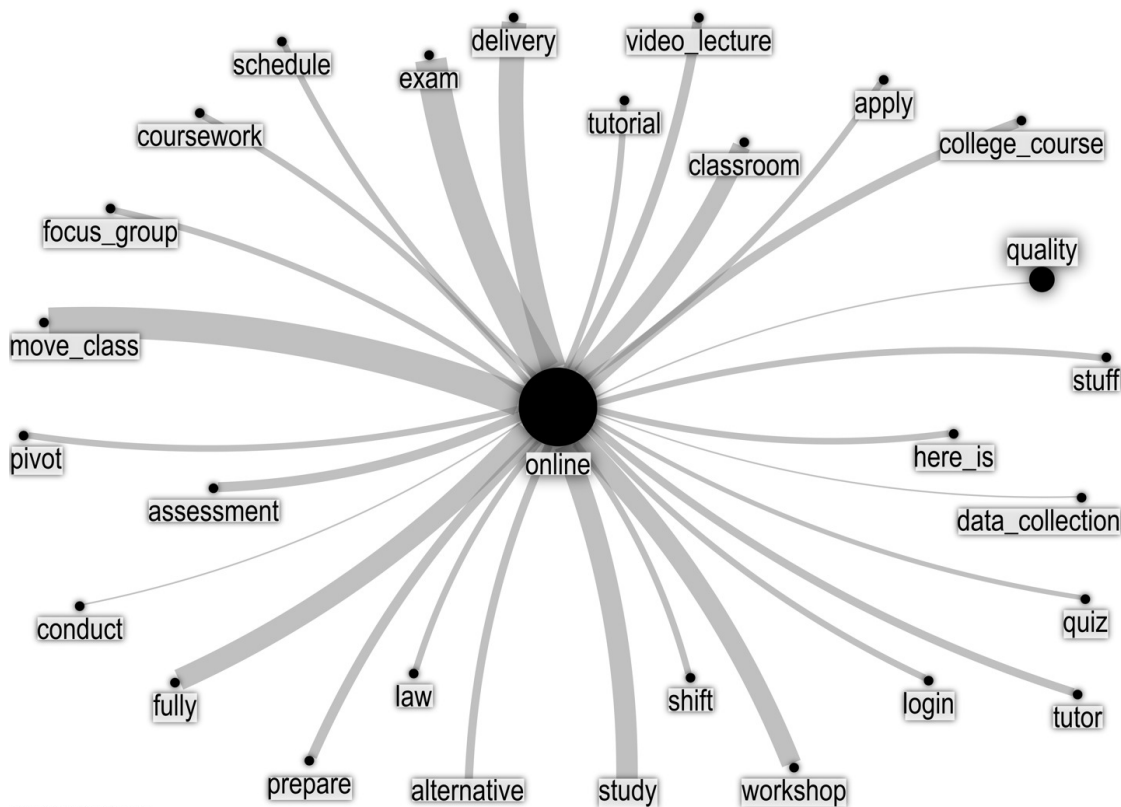
The reality of the mandate to “move\_courses—online” means that I teach from home. My kindergarten is also at home, so I’m homeschooling a child with ADHD. Not to mention that my husband has PTSD, and we’ve disrupted his routine. #AcademicTwitter.

While some struggled with the personal ramifications of the shift online, others lamented the impact on their ability to teach effectively: “Great. Now that I must ‘move\_courses—online,’ I’m struggling with the lack of control over my courses. The semester started off so well! Now it seems like chaos. #AcademicTwitter #COVIDCampus.”

Additionally, as faculty and academic workers moved their courses online, users on #AcademicTwitter discussed and debated creative strategies for working through the process of quickly moving courses online for both instructors and students. For some, individuals tweeted about the importance of not losing communication and trying to address student concerns early. As one individual shared: “As we ‘move—courses’ online, don’t forget to reach out to your students about their access to technology and whatnot! My students are freaked out, and we can do our best to address their concerns as much as possible!” Others reframed the shift online as opportunities for using the Covid-19 pandemic as an application to their teaching. One instructor tweeted, “I’m teaching a class about conspiracy theories....As we ‘pivot—online,’ I’m thinking about restructuring the course to be all about Covid-19!” As shown in the two previous tweets, users adopted various sensemaking strategies to understand and creatively work through the challenges of the pandemic’s disruption on their work. Their use of creative labor in sharing their experiences on the hashtag also offered opportunities for individuals to raise awareness of different resources and information about how to best serve the needs of both students and instructors.

##### 4.2. Knowledge Sharing

Knowledge sharing was the second function of #AcademicTwitter’s enactment of resilience. Knowledge sharing, or the act of sharing information and knowledge



**Figure 1.** Discussions around the shift to online teaching in #AcademicTwitter.

within a collectivity, has long been considered an essential function of membership in online CoPs (Wasko & Faraj, 2005). #AcademicTwitter is no exception to this in users’ engagement through the hashtag. As Figure 2 highlights, various sub-clusters in the semantic network refer to knowledge sharing in different ways. A primary way that knowledge sharing occurred was through sharing resources. Users often retweeted information regarding textbook publishers’ open-access efforts for students and academics. Tweets often referenced specific publishing companies (e.g., SAGE, Haymarket Books, or JSTOR) that provided several “free—downloads’ of awesome books that support #onlinelearning and #socialdistancing.” Others promoted technology resources like PollEverywhere which offered free premium memberships and trials for faculty members. Another function of knowledge sharing focused on resources for students. Various users reflected on individual students’ experiences and challenges given the pandemic, and others promoted additional resources for students struggling financially. For example: “#AcademicTwitter: I’ve attached a ‘great—resource’ to send to your students who may need additional financial support. #COVID19.”

Within #AcademicTwitter, many users took to the space to share knowledge and trusted the hashtagged space to be a font of knowledge and ideas for managing the disruption caused by Covid-19. For instance, two central nodes within Figure 2’s semantic cluster,

“good” and “great,” were often used in connection with ideas, conversations, or suggestions for resources. Some asked questions about technology and software recommendations; one user inquired: “Any ‘good—suggestions’ for daily calendars and project management software to use while we work from home (and after)? #AcademicTwitter.” Others used #AcademicTwitter to ask questions about best practices for managing the disrupted learning environment. For instance, one user reflected: “Hey #AcademicTwitter, I’ve lots of ‘good—suggestions’ about adjusting online. A popular idea is not requiring synchronous work and synchronous classes to help manage student stress. What do you think about this?” Others continued to share knowledge and advice related to managing academics’ well-being. Many users shared threaded conversations offering “‘great—advice’ for maintaining self and sanity” during Covid-19. For example, one user shared that the compounding disruptions of Covid-19, earthquakes, power outages, working from home, uncertainty in career, and dissertation writing were tough to manage. They asked: “Anyone have any ‘great—advice’ for how I can focus, concentrate, and keep moving forward? #AcademicTwitter.”

#### 4.3. Social Support

The final way users engaged in #AcademicTwitter was through social support, or the ongoing “exchange of resources...to enhance well-being” (Shumaker &

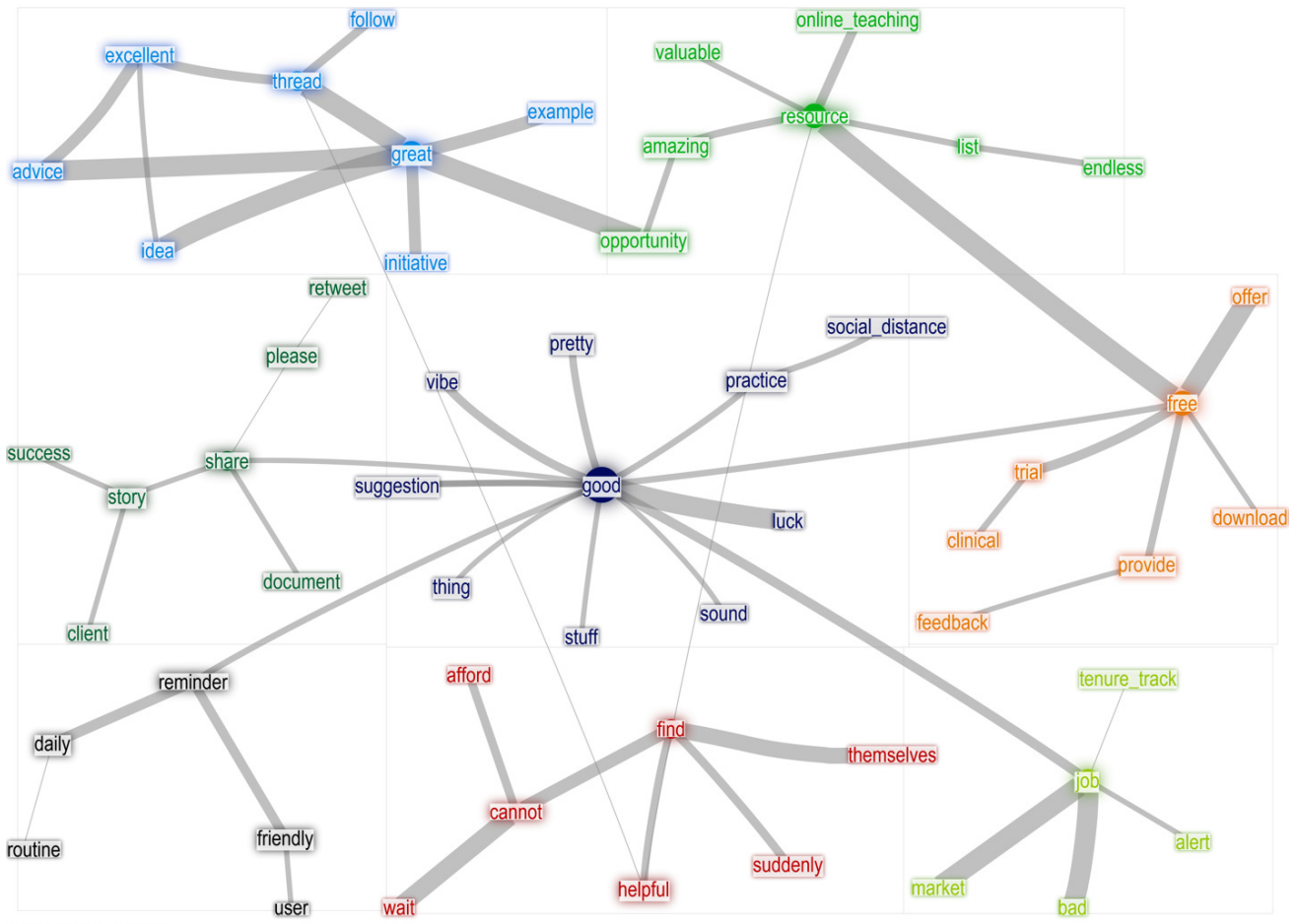


Figure 2. Discussions around knowledge sharing within #AcademicTwitter.

Brownell, 1984, p. 13). Social support occurred in #AcademicTwitter through individuals’ willingness to share their feelings and fears about the Covid-19 and its impact on academics’ work. In Figure 3, the central node within this cluster is “i\_am.” Nodes connected to “i\_am” are nodes like “concern,” “afraid,” “struggle,” and “exhaust.” Users tweeted about different experiences (positive and negative, humorous and severe). For example, one user humorously shared: “Now that my partner and I will be working remotely together, ‘i\_am—afraid’ that they’ll now see how long I spend in bed scrolling on my phone!!!”

Others offered concerns about the overall impact of Covid-19 on their respective disciplines: “I don’t know about you, but ‘i\_am—afraid’ that #COVID19 will affect our productivity. Sure, we can go to the library and keep reading academic research, but the cancelled opportunities for in-person professional development will be a big loss! #AcademicTwitter.” Like this sentiment, users shared a sense of loss because of Covid-19. For instance, a user argued:

This is NOT normal, and we need to acknowledge that. Normalize being not okay. Normalize saying, “i\_am—struggling.” We are all struggling with our productiv-

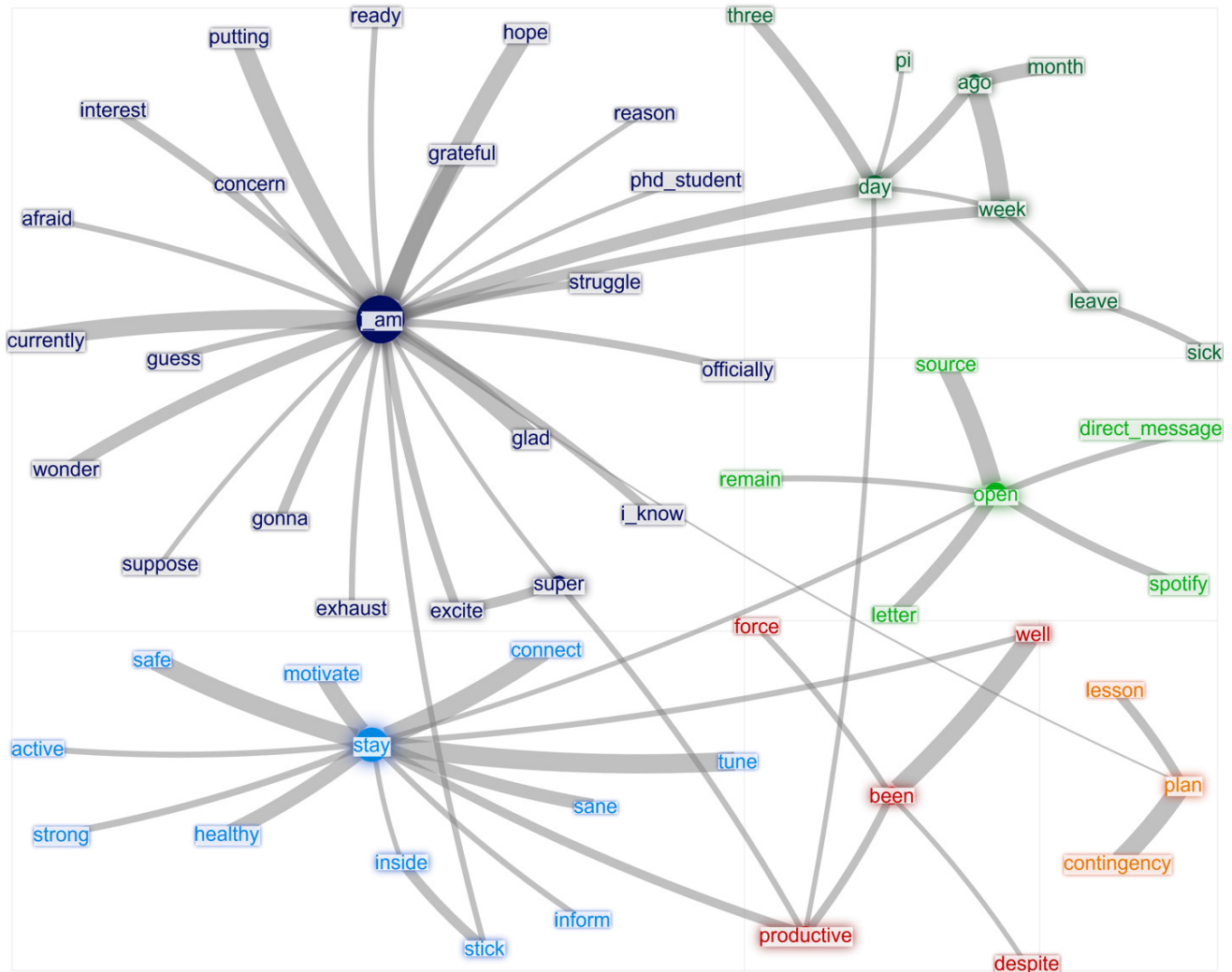
ity, the anxiety of the ongoing pandemic uncertainty, and the loss of cancelled experiences. This is NOT normal. #AcademicTwitter.

Despite the prevalence of fear and uncertainty within #AcademicTwitter, another facet of the hashtag was users’ willingness to make the best of the conditions triggered by Covid-19. Some individuals used #AcademicTwitter to acknowledge specific mentors and colleagues that were helpful, and others mentioned the institutional support offered by their university. Others sought to background negative emotions in favor of foregrounding positive aspects present in their lives (e.g., practicing gratitude). One user reflected:

Filming my lectures in the random spaces in my house that aren’t cluttered by toys or during my child’s hour-long nap, and I can’t help but think about how I’ve got lots of support and resources to get through this. “i\_am—grateful” for that! #AcademicTwitter.

Others referenced #AcademicTwitter as a specific space that helped to normalize the pandemic’s impact on academics’ work. One user tweeted:





**Figure 3.** Discussions around social support within #AcademicTwitter.

It’s difficult to stay productive during this time, but “i\_am—grateful” for the #AcademicTwitter community in making it okay to say that we’re in a difficult time! Remember—we’re doing the best we can, and we should be taking care of ourselves, too!!!

#AcademicTwitter offered social support in various ways that served to make space for fears, acknowledge the stress and frustration of the pandemic, and provide a communal opportunity to find gratitude for their lives, their offline community, and the online social networks that they maintain.

**5. Discussion**

Building on research related to virtual/online CoPs and the communicative theory of resilience, our goal in this article was to illustrate how organizing hashtagged spaces can constitute a form of resilience. The three processes that we uncovered within #AcademicTwitter (e.g., sensemaking, knowledge sharing, and social support) worked together to produce a specific kind of

resilience in the context of work—what we introduce as resilience-craft. Taking the three themes together, resilience-craft is constituted in CoPs through the communicative acts of solidarity, information sharing, and offering support within #AcademicTwitter. Given these findings, we introduce resilience-craft as a unique online communicative process that extends resilience (and resilience labor) theorizing and integrates this line of theorizing within the community of practice scholarship.

*5.1. Theorizing Resilience-Craft*

To conceptualize resilience-craft, we draw from both Agarwal and Buzzanell (2015) and Tracy and Donovan (2018) to showcase the labor and enactment of resilience through ongoing work situations impacted by crisis or disruption. Regarding resilience labor, Agarwal and Buzzanell (2015, p. 412) note that resilience is created through resilience-building in others and oneself and is a continual process of “both accepting reality pragmatically and making creative adjustments to adapt to, and potentially change, circumstances.” Ford (2018)

built on Agarwal and Buzzanell's concept and argued for a reconceptualization of resilience as not just moving on from disruption but also endurance. Ford (2018, p. 253) argued that "resilience is a different process in a context where the source of the disruption is also the focus of the work." Given the ongoing focus of Covid-19 within #AcademicTwitter, we proffer that academics' use of the hashtag represents a form of resilience labor that is made possible through the ongoing and uniquely improvised knowledge sharing, support, and advice made possible vis-a-vis resilience-craft. In doing so, academics cultivate individual (e.g., for individual academics and users) and communal forms (e.g., shared throughout the #AcademicTwitter community of practice) of resilience by their engagement with #AcademicTwitter. Our study demonstrates how the dynamic interplay of hashtag affordances enables users to create communal resilience online while simultaneously adapting their offline work in response to their engagement.

Regarding the notion of craft, Tracy and Donovan (2018) conceptualize craft practice as a uniquely engendered form of expertise, wherein key leaders continually use jargon to solidify their organizational commitment. Resilience-craft, then, is the integration of the creative labor involved in giving and cultivating resilience (e.g., sensemaking, knowledge sharing, and social support) *and* the use of the highly specialized hashtagged space, #AcademicTwitter. That is, by drawing upon academics' lived experiences, their networks, and their expertise (in scholarship, teaching, and learning), #AcademicTwitter serves as a valuable networked and online space through which resilience is constituted as users give and build resilience individually and collectively. During the early days of the pandemic, the expertise and knowledge shared throughout #AcademicTwitter was vital for academic workers as they navigated new work realities, shifted priorities, and managed the emotional and mental stress caused by the pandemic. As was remarked in countless peer-reviewed and public presses alike, Covid-19 brought forth unprecedented education disruption and learning crises, which forced educators at all levels to leverage expertise, collaborate across borders, and provide support in new and unanticipated ways (d'Orville, 2020). Our study highlights how the collective expertise shared in #AcademicTwitter transcended traditional conceptualizations of CoPs that focus on task and learning by shifting the role of expertise to be one of commitment to the collectivity of academics on Twitter.

We offer resilience-craft to explain and differentiate the communicative enactment of resilience in #AcademicTwitter. Different from improvised resilience and creative labor, we highlight how #AcademicTwitter works together through the hashtag. That is, the hashtag affords an explicit focus on *both* knowledge-building and community engagement. Hashtags have been given much scholarly attention in recent years for the communicative affordances that support organizing (see

Jackson et al., 2020). We situated our study within the scholarship of CoPs by focusing on the communicative elements of the hashtag as an organizing space for academic workers (Eddington, 2018). Although writing about the role of #hashtagactivism, Jackson and colleagues describe, "for those individuals and collectives unattached to elite institutions, Twitter, and the unifying code of the hashtag, have allowed the direct communication of raw and immediate images, emotions, and ideas and their widespread dissemination in a way previously unknown" (Jackson et al., 2020). So, too, can hashtags cultivate similar communicative practices during crisis and disruption. We contend that hashtags, as a communicative affordance, enable resilience-craft to be constituted through academic workers' ongoing engagement in the hashtagged space. Although improvisation and creative workarounds can exist in #AcademicTwitter through the types of advice given that are not typically expected from academics (e.g., surviving a quick transition to online teaching, especially for members of the academy not trained to teach online), the hashtag itself appeared to transform the traditional community boundaries and norms during the nascent Covid-19 crisis. Additionally, while vital to sustaining various forms of expertise within the online community of practice, the three communicative processes we identified (e.g., sensemaking, knowledge sharing, and social support) worked together to constitute resilience during times of crisis. That is, different from other theorizing of online CoPs, and #AcademicTwitter specifically, our study foregrounds the ongoing Covid-19 pandemic as a triggered disruption to the everyday realities of academics.

In times of crisis, the types of communication that organize CoPs serve dual purposes of learning and community to enact resilience-craft. Our study showcases how the communicative functions and processes embedded that organize online, hashtagged CoPs can shift quickly to respond, adapt, and transform professional communities online and offline. Pasquini and Eaton (2021) contend that online professional communities are normal for various members of the academic community, and the networked boundaries that are created through these spaces transcend both work and personal lives. During the initial months of Covid-19 impact across the world, #AcademicTwitter served as a space that both continued traditional forms of community of practice activities and expertise while making a marked shift in solidarity with the everyday lived realities of academic workers. In doing so, the resilience-craft enacted through the willingness of individuals to reflect and share their experiences, offer support and resources, and normalize the ongoing pandemic impacts that gave voice to both the online and offline experiences triggered by the pandemic.

## 5.2. Practical Implications

Given the ongoing disruptions caused by Covid-19, our study shed light on a crucial practical implication.

Individuals used #AcademicTwitter as a space to often vent their frustrations about the compounding issues related to work and care in the academy. As our study examined the initial days of the pandemic, Davies (2021) examined a smaller corpora of Twitter data from #AcademicTwitter (between April and July 2020) and found the notion of institutional critique becoming more prevalent as the pandemic continued. Individuals felt a lack of ongoing institutional support and care, particularly around issues related to gender, access to technology, and the notion of academic productivity. For example, Davies (2021, p. 8) shared:

One tweeter wrote, addressing those anxious about their levels of productivity, that the pandemic “accentuates privileges” and that not everyone was able to be productive to the same extent, while another talked about the “duplicitous bullshit” of rewarding people who were managing to be particularly productive at a time of global crisis.

Taking this into consideration, administrators and senior leadership at universities would do well to re-examine their work-life policies, funding, and job-related demands given the fissures exposed via Covid-19.

Additionally, #AcademicTwitter is a useful space for academic workers to share their experiences. Our findings emphasize that Covid-19 and the Great Migration represent a change in work experiences—especially among tenure-track professors. As such, administrators and senior leaders should find ways to acknowledge the adverse work experiences and stressors that were heightened during the pandemic. This could mean adjusting annual evaluation processes, reimagining and recalibrating demands for tenure, or normalizing the pandemic’s impact on their work when going up for tenure. That is, the issues that we surfaced existed prior to Covid-19, yet the pandemic illuminated the various ways that inequities are institutionalized throughout academe.

Further, the notion of resilience-craft, which we theorize in this article, reveals the additional and improvised labor that many academics engaged with during the pandemic. Resilience-craft uniquely showcases those processes through which disruption and unease became a normative part of the work environment for academics. Supervisors and administrators alike should recognize the new forms of labor that were required for academics to remain afloat. Things like meeting students’ emotional needs, sitting with students through moments of pain, and providing empathetic support are not frequently considered in the process of promotion, yet became increasingly commonplace throughout the pandemic.

### 5.3. Limitations and Future Directions

Like all research, this study is limited in some ways. First, our use of the Twitter data from mid-March to April 2020 only captured a glimpse of academics’ experiences

during Covid-19. That is, as most colleges resorted to online learning for the bulk of the 2020–2021 school year, future research could examine the evolution of the resilience-craft discourses throughout the preceding year and a half as college educators began to transition back to in-person instruction or returned to “normal.” Second, although our study examined the semantic networks of tweets, there are immense possibilities and opportunities to explore academics’ lived realities more deeply. Throughout our networks, the persistent references to fear (for self and others), the anxieties and stressors triggered by the ongoing pandemic, the management of working from home, and balancing work and personal lives would enrich our ongoing understanding and sensemaking of the social impact of Covid-19. Future studies could adopt qualitative approaches (e.g., interviews, photo-elicitation, photovoice) to understand the lived experiences of academics more richly during Covid-19. Third, given our focus on the content of the hashtag during the early months of the pandemic, our analyses did not include information about the academics that make up #AcademicTwitter. There are opportunities to explore more fully the social networks of help and support that were leveraged during the crisis. Extending methodologies adopted by Gomez-Vasquez and Romero-Hall (2020), future studies could utilize social network analyses to explore and map key users of #AcademicTwitter during this time to showcase the types of diversity in academic workers (e.g., nontenure-track, adjunct professors, administrators, tenure-track) that constituted the online CoP.

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### Conflict of Interests

The authors declare no conflict of interests.

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Article

## Community-Building on Bilibili: The Social Impact of Danmu Comments

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### Abstract

Danmu commenting is a new feature of the streaming industry, popular in East Asia. Danmu comments are displayed as streams of comments superimposed on video screens and synchronised to the specific playback time at which the users sent them, moving horizontally from right to left. Interestingly, users do not have options such as “replies” to structure their comments; their interactions commonly include poor addressivity, hidden authorship, and unmarked sending time. The ways in which users actually interact with each other and, more importantly, the implications of such danmu-enabled social interactions on building virtual communities are so far understudied. Through a case study centred on Bilibili, a leading Chinese danmu platform, this article argues that in spite of their visually chaotic manner, the social interactive patterns of danmu commenters contribute to community building. Under the theoretical framework of “sense of virtual community,” the study adopts a data-driven methodology to qualitatively analyse such fragmented data. Results show that Bilibili users have discovered various ways to initiate social contact with each other through the creative use of linguistic and semiotic resources. Their ritualised performance in the Bilibili community is centred around the social aims of danmu comments, danmu clusters, and danmu language, all of which strengthen their sense of virtual community on the dimensions of membership, influence, and immersion. This article contributes to the research on this emerging media phenomenon by illustrating a new mode of watching and engaging in a participatory online community of practice that this platform encourages.

### Keywords

Bilibili; community-building; danmu; digital culture; unstructured comments

### Issue

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## 1. Introduction

The danmu (or *danmaku* in Japanese) interface originated on NicoNico, a Japanese video website, in 2006, and was later popularised in nearby East Asian countries including China. Unlike traditional online comments placed below the video frame and typically posted by viewers after watching the video, danmu comments are displayed as streams of scrolling comments overlaid on the screen and synchronised to the specific playback time at which the users sent the comments, moving horizontally from right to left. Climatic moments in the videos attract many danmu comments which can obscure the image in the video, causing a visual effect that resembles “弹幕” (danmu, which literally translates to “bullet

curtain” in Chinese); hence, this type of online commentary is known as danmu comments. Adopted by nearly all major video sites in China, the introduction of the danmu interface has substantively changed the way internet users enjoy online videos, which, over time, has morphed into a distinct cultural phenomenon in the Chinese digital sphere.

### 1.1. Social Functionality of the Danmu Interface

The danmu interface, which interweaves text-based social media into video media, has aroused academic interest. Scholars have explored users’ motivations for participating in danmu-enabled video consumption (Chen et al., 2017; Hu et al., 2016), the translation and

linguistic applications of danmu comments (Yang, 2020; Zhang & Cassany, 2020), and its commercial implications (Liu et al., 2016; Xiang & Chae, 2021). Scholars have widely referred to the watching of danmu videos as a social experience but fall short in stressing the importance of the social functionality of the danmu interface in an explicit and compelling manner. This article asserts that the social functionality of the danmu interface is the foundation for its popularity and its strong impact on community building.

Compared with viewers of “second screens” or “social TV” outside of China, who seek out co-viewing experiences by using various technology-enabled backchannels such as Twitter to share their opinions while watching TV, the danmu interface provides users with a more advanced, convenient, and immersive social co-viewing experience. By allowing audiences to insert and mark their comments at a specific playback time in a video, the viewers do not need to shift their gaze back and forth between two screens, avoiding an incoherent and loose connection between the videos and discussions. A stronger common space is created for discussing issues specific to the current context of the content. Viewers can exchange detailed information at the time of the actual viewing, rather than general impressions and post hoc reflections. Users do not need to specify what prompted their thoughts, because the context in which their comments are situated provides sufficient explanation.

Therefore, an impression of a pseudo-synchronic co-viewing experience is created for audiences (Johnson, 2013), removing the temporal and physical constraints associated with face-to-face co-viewing activities, and further enlarging the scope of co-viewers. Temporally asynchronised and geographically dispersed audiences, surrounded by the “presence” (Hwang & Lim, 2015, pp. 755–765) of co-viewers, can enjoy a sense of watching videos with company (Han & Lee, 2014). The danmu interface design is centred around overcoming the limitations of temporality, and thereby fulfils viewers’ needs for companionship and satisfies their urge for interactive self-expression and their desire to belong to a community (Chen et al., 2017). Danmu comments are left on their own on the screen; this anonymity gives users a sense of safety to unleash their feelings and imagination with other viewers with common interests, encouraging a deluge of immediate online chat.

Hedonistic values that the danmu interface offers viewers, such as entertainment, passing time, and relaxation, also contribute to the pleasure that they derive from watching danmu videos. Reading humorous comments posted by earlier audiences encourages users to watch danmu videos (Fang et al., 2018). Comments which creatively ridicule the people or things in the videos, or perfectly express the users’ own interpretations of the content, can spark emotions in viewers. Sometimes, audiences even watch a poor-quality video just for the thrill of making fun of the content together (Yuan et al., 2016).

Thus, the danmu interface constantly invites increasing levels of participation from viewers into the user community. They can communicate in formal or informal, thought-through or spontaneous, or interest-based ways over the video content. It is not an exaggeration to claim that the danmu interface creates not only a new mode of watching videos but also a new way to build and maintain a sense of community. Naturally, the advent of danmu commentary has restructured the media landscape in China through fostering a sense of virtual unity via a platform-based video culture and a shared interface (Li, 2017).

Vastly different from other social media sites which include threaded comments in a discussion section, the danmu interface does not afford a structured commenting service for its users. Interactions on Twitter, for instance, exist among connected users, and their common practices include mentions, replies, and retweets. In contrast, danmu users do not enjoy such options. The social interactions among danmu commenters occur under the conditions of poor addressivity (the technological inability to specify the addressee[s] of the recipient[s] of a danmu comment due to the design of communicative interface), hidden authorship, and unmarked sending time. Despite such technological constraints, danmu users in the Bilibili community appear to have successfully adapted to and enjoyed the medium.

To date, comparatively little work has been done to explicate the ways in which danmu users communicate with each other. Ma and Cao (2017), among other findings, briefly introduced the interpersonal interactions among danmu users. Bi (2020, p. 111) analysed the connectivity between danmu comments, fostering “living networks” connected to both the videos and the platform. Zhang and Cassany (2020) examined the coherence of the comment chains from a semiotic perspective. By building on their works, three prominent features can be identified in the social interactions of danmu users: (a) The social aims of danmu commenters; (b) the clusters of danmu comments; (c) the language resources used to facilitate such social interactions.

This article is dedicated to mapping these three social interactive patterns through an evidence-based qualitative analysis of danmu comments. Furthermore, this article considers the impact of these patterns on the central issue, the community-building of Bilibili, which concerns the continued growth and potential of the platform.

### *1.2. Virtual Community-Building on Bilibili*

To start with, it is necessary to justify the definition of the Bilibili community as a virtual one. Lee et al. (2003) gave a working definition for virtual community: a cyberspace supported by computer-based information technology, centred upon the communication and integration of participants to generate member-driven contents, resulting in the building of relationships. Through the danmu interface, Bilibili users “gather together,” generate social ties,

and cultivate a sense of belonging, thereby constituting a virtual community. All the registered Bilibili users form a big virtual community. Simultaneously, this community comprises countless ephemeral subcommunities attached to individual videos and relatively long-term subcommunities of interest: for instance, those made up of followers of a certain uploader. The boundaries of these subcommunities are porous because individuals may have more than one cultural or aesthetic preference in video-watching and may navigate between several subcommunities.

In the current literature, the Bilibili community as a whole is largely understood as a collective of young Chinese internet users whose cultural preferences are closely associated with animation, comics, and games (ACG) products. Little is yet known about the mechanism of virtual community-building on Bilibili. In Zhao et al.'s (2017, p. 359) design for future fieldwork, they predict a cognitive self-awareness by the group membership referred to as “we-intention,” but have not yet released their research outcomes. This article is the first attempt to elucidate the community-building dimension of Bilibili by analysing the social interactions among danmu commenters.

The rest of this section contextualises the Bilibili community to provide a better understanding of who is commenting and why. In the Chinese digital media ecology, Bilibili is in the unique position of having built the largest online co-viewing community for youth culture. According to this company's financial results in the second quarter of 2021, the platform hosted 62 million daily active users (Bilibili, 2021). Bilibili's growth engine relies on user-generated content in the style of YouTube; fundamentally different from other streaming giants like Tencent Video and iQiyi which rely on Netflix-style, professionally produced copyrighted programs. Moreover, the user-generated content on Bilibili refers to both the videos and the danmu comments.

Bilibili is a pioneering Chinese platform that incorporated the danmu interface in 2008 and is now the most popular video platform of this kind. The majority of danmu scholars have based their research around Bilibili's dominant market status. The added social benefits provided by the danmu interface can certainly give a strong boost to the development of a given video platform. Indeed, Bilibili treats the danmu comments generated by video users as no less an important pillar than the user-generated videos that this platform relies on for monetisation.

Bilibili exploits the additional space created by the danmu interface to enhance audiences' participation and engagement and to retain their membership both technologically and culturally. To encourage commentary, the danmu commenting service is turned on by default, inviting the users to join the video chats. Each comment is limited to a maximum of 30 Chinese characters, requiring little time and effort to post. Viewers can easily type text into the danmu comment box right below

the video frame and post their comments directly to the screen at the point of submission. Registered users can adjust the font, size, transparency, and speed of viewable texts to increase the visibility of their own comments; those who prefer to be less distracted by the comments can also activate the anti-block function and filter the comments by movement, colour, and type.

Beyond its technological advancements, Bilibili cultivates the communities it hosts. Primarily, its attention has been focused on attracting young Chinese internet users into its user community. Initially, Bilibili focused on ACG content, labelling itself as the first forum for Chinese ACG fans. To filter and attract its preferred audiences, Bilibili has adopted a membership plan to develop its community of registered users. Anyone wishing to post danmu comments is required to complete a membership test involving 100 questions about the ACG culture and danmu netiquette. Bilibili is meaningful and entertaining to users who make efforts to pass the test.

Over time, the platform has expanded its target audience to a wider population by integrating more genres such as movies, music, dance, etc. Young Chinese internet users can always find a niche topic that they are fascinated with on Bilibili. This suggests that Bilibili aims to be an incubator for online youth culture (Xu, 2016). Bilibili users are gradually forming various interest-based communities which loosely revolve around a certain set of media products and become home to like-minded people linked by certain themes, dispositions, affects, and emotions (Chen, 2020). In short, Bilibili functions as a virtual headquarters for online youth cultures and fandoms of China.

Danmu interface affords an “affective contact zone” (Li, 2017, p. 238) for the Bilibili community, uniting viewers with a collective temporal experience of simultaneous viewing and creating a feeling of a highly immersive community that is organically present and intimately welcoming. Bilibili users invest themselves into this affective community by sharing their opinions and sentiments with like-minded cohorts. Over time, their commenting practices become ritualised both socially and linguistically, which further turns posting danmu comments into an act of membership-reinforcing communal signalling.

### *1.3. Research Questions, Data, Theoretical Framework, and Research Methods*

This article focuses on mapping the social interactive practices among danmu users and evaluates their impacts on the community-building of Bilibili regarding the following research questions:

RQ1: What patterns of social interaction can be observed in the danmu comments of the Bilibili community?

RQ2: What language resources, exploited by the danmu users to facilitate their social interaction, can be identified?

RQ3: How do these interactive patterns of danmu users contribute to the community-building on Bilibili?

Bilibili users have posted countless danmu comments on the ocean of user-generated videos on this platform. It would be impossible and unnecessary to collect and examine all the danmu comments. Therefore, this article will focus on conducting a case study of danmu comments posted on Russian President Putin-related videos, which were uploaded by one of the top 100 uploaders—*The Observer*—on Bilibili; this topic arose from a larger project on the representation of Russia in the Chinese social media. *The Observer* is an online media outlet that exclusively targets Chinese internet users and runs an official channel on Bilibili. Being literate in the entertainment-dominated media ecology of Bilibili, *The Observer* introduces a high proportion of playful elements in its videos because playfulness contributes to capturing the attention of its audience (Wang, 2021). Among the total of 24 Putin-related videos in the dataset, only six videos are politically oriented. Platform-wise, Bilibili is not designed to support the circulation of serious political debate and users tend to be uncomfortable consuming hard politics or even partisan news. In these videos, Putin has been made into the selling point by the uploader as a political celebrity and icon of Russia (Goscilo, 2013), showing his “box office appeal” for the Bilibili audience.

The light-hearted response to this media highlights that Bilibili users’ social interactions are similar in their playful tone, regardless of the nature and content of the videos. In a study on users’ responses to political speeches, Yu et al. (2018) found that danmu comments appear to be jovial and relaxed rather than constructive or inclusive. Serious political videos and entertaining media clips, and anything in between, all tend to receive informal treatment, to a greater or lesser extent, by users. The dataset analysed comprises all the danmu comments (7,302 in total) posted to the 24 Putin-related videos selected by the uploader. Although the dataset is not inclusive of all the danmu comments posted on Bilibili, it is representative of the commenting patterns.

On first inspection, these danmu comments are typically short and more fragmented, less coherent, and less comprehensive than conventional online comments displayed below the screen. It is worth bearing in mind that the danmu comments on the screen merely display all previous comments at the time of viewing, erasing the actual time-lapse between comments. When posting, users are either responding to a previous user or sharing their opinions with future viewers. They are usually aware that subsequent viewers pay attention to their comments while watching. Hence, they are not only commenting on the videos but also communicating their feelings or opinions with their imagined interlocutors. Such behaviours enable the analysis of danmu comments as social interactions between those posting comments and viewers.

Often, danmu comments are written in subcultural dialects only decipherable by insiders. To communicate effectively with other like-minded viewers, diverse linguistic, and semiotic resources are mobilised by users, such as internet buzzwords and symbols. The language repertoire shared by Bilibili users enables them to interact in an expressive and dynamic manner, which is deeply rooted in their cultural and communal identities.

For this case study, two coders imported the comments into an SPSS file and coded them against variables tailored to the research aim. The inter-coder reliability between the two coders reached 89% which is above the threshold suggested by Cohen (1960). The analysis is interpretive in nature, and the coders are culturally and linguistically proficient in the online communicative practices of Chinese youth. In fact, they are frequent users of Bilibili.

The variables (see Table 1) were developed based on a fine-grained content analysis of the social interaction modes inductively observed in the dataset. To increase the reliability of the study, the videos and the comments were reviewed three times before coding. Watching the corresponding scenes helps to explain the context in which the comments arose. The variables focus on the social aims of the danmu users, the clustering of danmu comments, and the language used in the comments to facilitate communication. The variables regarding the social aims of danmu comments and the danmu language offer a set of generalised options based on inductive observation. Thirteen social aims of danmu commenters have been identified by considering danmu commenting as a social action in which commenters “talk” with each other, mirroring face-to-face conversation. Eleven types of language practices have been observed by focusing on the linguistic and semiotic characteristics of the usage of Chinese and foreign languages of danmu commenters.

Sometimes, several subsequent viewers have been provoked by a particular danmu comment on the screen and participate in a dialogue or debate on a certain issue regarding the videos, forming a cluster of danmu comments. Spatial proximity captures the physical closeness of several comments on screen. Whenever an element in a video resonates with several viewers, their follow-up comments usually synchronise within a short period. The content of these comments is thematically or topically similar. Through the combination of these two indicators, spatial proximity and content similarity, a danmu cluster is identifiable. The danmu cluster variable is a structured question; if answered positively, the comments in a cluster are marked with the number of the first comment in that cluster. Danmu clusters are formed by comments with various social aims, mostly comments agreeing with or repeating the opinions of one or more commenters. However, they are unique in the co-viewing activities by collectively occupying a visible space on the screen and demonstrating the common interests of danmu commenters.



The full coding scheme is listed in Table 1 below.

Subsequently, these interactive patterns of danmu practice have been analysed using the conceptual framework of sense of virtual community (SOVC) proposed by Koh et al. (2003). Drawn from McMillan and Chavis' (1986) place-based sense of community, Koh et al. (2003) conceptualised a descriptive framework for the construction of virtual communities, a common phenomenon in the digital era. They retained two components of McMillan and Chavis's (1986) conceptualisation—membership and influence—and included a scale of immersion. Their SOVC framework covers three dimensions:

1. Membership: People experience feelings of belonging to their virtual community.
2. Influence: People influence and/or are influenced by other members of their community.

3. Immersion: People experience a state of flow in which they enjoy great pleasure and perceive a quick passage of time due to concentration on their current activities.

This framework is a key construct in understanding the social dynamics among Bilibili users and in investigating the community-building mechanism on Bilibili. The social interactive patterns identified in this analysis are meaningful for community-building on Bilibili by creating and consolidating the sense of membership, influence, and immersion experienced by danmu users.

Using qualitative coding, this section offers nuanced insights on communication influx within a wider socio-cultural milieu. Although the data may not provide a sufficient basis for generalisation about all of the complex digital behaviours of Bilibili users, the aim of this exploratory study is to generate original insights into the

**Table 1.** Coding scheme categorising social interactions among danmu comments.

Variable	Label	Value
DanmuInteraction	How does the danmu comment interact with other viewers?	<ol style="list-style-type: none"> <li>1. The commenter is agreeing with (an)other commenter(s)</li> <li>2. The commenter is critiquing (an)other commenter(s)</li> <li>3. The commenter is answering a question asked in a previous comment</li> <li>4. The commenter is repeating the words/ideas of (an)other commenter(s)</li> <li>5. The commenter is asking for background information</li> <li>6. The commenter is offering background information</li> <li>7. The commenter is joking about some element in the video</li> <li>8. The commenter is pointing out something in the video that other commenters may not have noticed</li> <li>9. The commenter is imagining how they would have filmed the actions differently or what they would have said or done if they had been involved in the activity in the video</li> <li>10. The commenter is making a suggestion for the actors in the video</li> <li>11. The commenter is revealing personal information</li> <li>12. The commenter is expressing their immediate personal reaction to something in the video</li> <li>13. The commenter is expressing a relatively long and serious opinion on something in the video</li> </ol>
DanmuCluster	Is the danmu comment clustered with other danmu comments?	If so, mark this danmu comment with the number of the first comment which this comment is clustering with
DanmuLanguage	What special language is used in the danmu comment to facilitate social interactions?	<ol style="list-style-type: none"> <li>1. Chinese internet buzzwords</li> <li>2. Chinese dialects</li> <li>3. Transliterations</li> <li>4. Foreign languages (e.g., English)</li> <li>5. English acronyms</li> <li>6. Code-mixing</li> <li>7. Arabic numerals</li> <li>8. Kaomojis</li> <li>9. Lexical repetition</li> <li>10. Conjunctions</li> <li>11. Directional symbols</li> </ol>

mechanism of social interactions among danmu users in the Bilibili community.

## 2. Social Interactions Among Danmu Comments

Bilibili users demonstrate their passion towards videos by posting danmu comments. They exploit various channels to initiate social contacts with co-viewers with creativity and playfulness. Their ritualised participatory practices create and strengthen their sense of belonging to a certain community.

### 2.1. Social Aims of Danmu Interactions

Thirteen interactive social aims were observed in the dataset (see Table 2). A common attribute between these interactions is that they are mainly one-directional conversations. Although the pseudo-synchronicity of the danmu interface contributes greatly to the popularity of the danmu comments, it nevertheless affects users' interactive patterns.

As argued in Section 1.3, danmu users are interacting with their imagined interlocutors about the videos. These interlocutors generally fall into two main groups: one/several previous danmu user(s) and the entire viewership. The latter includes users who are happy to show their visibility in public via danmu commenting and those who prefer to be silent; in Chinese, such passive viewers are referred to as “围观群众” (bystanders). Goldkorn (2012), a Chinese cultural observer, describes “围观” (bystanding) as an activity in which people adopt a spectator mentality and engage simply to observe what is going on. In English, such audiences are often referred to as “lurkers.” Those bystanders are included in the Bilibili

community for their ability to understand the meaning and value of the given content and to serve as the recipients of danmu comments, contributing meaningfully to the online communication as danmu commenters.

Categories one to four are interactions with specific addressees, while the remaining categories (five to 13) have no specific target. Most of the comments, consisting of nearly 81% of the total dataset, are posted without a specific addressee for various social aims, indicating that the users chat in a relaxed and talkative atmosphere and viewers socialise for fun rather than for serious political debate. The technological design of the danmu interface encourages prompt responses as opposed to in-depth opinions developed after careful thought. Rather than produce long sentences to elaborate their feelings and opinions, users only need to type out their immediate reactions and feelings.

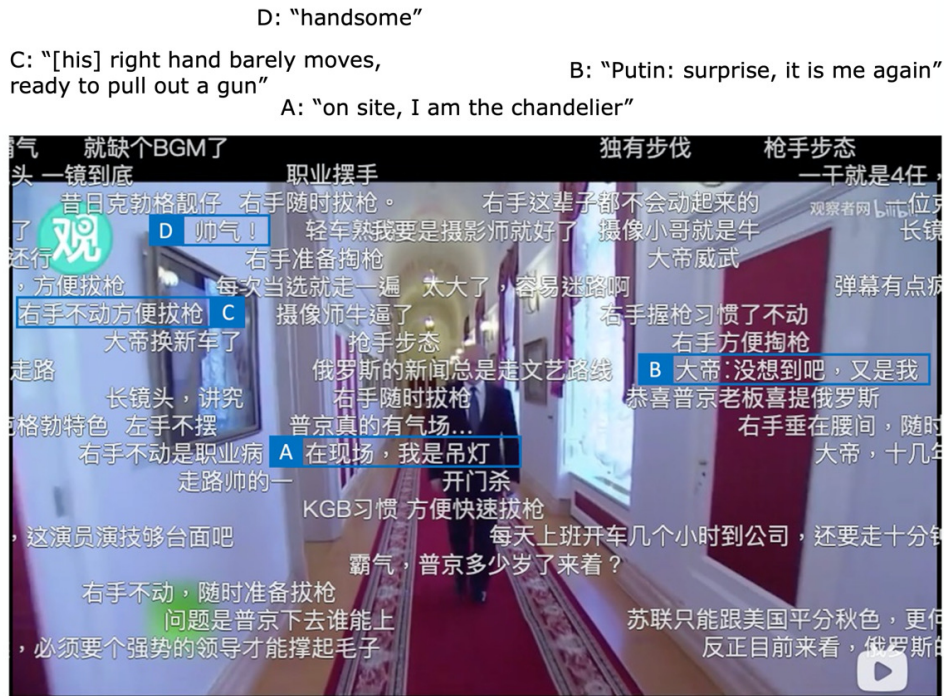
#### 2.1.1. Danmu Comments Without Specific Addressees

These random chats mainly revolve around the video content. For example, as Figure 1 shows, the view of Putin walking on a long red carpet in the Kremlin has inspired a flood of light-hearted danmu comments from the audience.

Users can fantasise about a scenario in which they are involved in the scene, for example, as Comment A claimed, “On site, I am the chandelier.” Users may even imagine they can speak on behalf of the characters, such as Comment B writing “Putin: surprise, it is me again.” In Chinese internet slang, such a voiceover is known as overlapping sound. Comment C mentioned the way Putin walks and pointed out that “[His] right hand barely moves, ready to pull out a gun.” Some users just

**Table 2.** Distribution of social aims of danmu commenters.

Social Aims	Number of Danmu Comments	Percentage in the Dataset
1. The commenter is agreeing with (an)other commenter(s)	107	1.47%
2. The commenter is critiquing (an)other commenter(s)	230	3.15%
3. The commenter is answering a question asked in a previous comment	51	0.70%
4. The commenter is repeating the words/ideas of (an)other commenter(s)	975	13.35%
5. The commenter is asking for background information	374	5.12%
6. The commenter is offering background information	455	6.23%
7. The commenter is joking about some element in the video	1,502	20.57%
8. The commenter is pointing out something in the video that other commenters may not have noticed	1,359	18.61%
9. The commenter is imagining how they would have filmed the actions differently or what they would have said or done if they had been involved in the activity in the video	695	9.52%
10. The commenter is making a suggestion to the actors in the video	67	0.92%
11. The commenter is revealing personal information	221	3.03%
12. The commenter is expressing their immediate personal reaction to something in the video	1,058	14.49%
13. The commenter is expressing a relatively long and serious opinion on something in the video	208	2.85%



**Figure 1.** A screenshot of the video titled *A Grand Presidential Inauguration Has Taken Place in the Kremlin, Opening Putin’s Fourth Term.*

give quick, immediate reactions to what they see, for instance, by posting “handsome” (Comment D) to voice their support for Putin.

These comments without addressees are emotionally rich, and together they can create an immersive, engaging illusion of group viewing (Ma & Cao, 2017). The danmu interface seems to be regarded as a tolerant space where the viewers can unleash feelings and imaginings which they may be uncomfortable and embarrassed to express in real life. Their immediate, ephemeral emotions and thoughts are accepted as normal by the entire audience. Such acceptance matters, facilitating a sense of membership by providing emotional safety for Bilibili users. When users feel that their individuality is not judged by others, they feel encouraged to form a strong attachment to the community. Moreover, such light-hearted interactions engage the audiences and users on an emotional level when they watch the videos, which is a form of investment that strengthens their feeling of belonging to this community.

Most of the danmu comments convey an apparent playful tone. Only a small number of them engage seriously with the video content and adopt an explicitly serious tone. Providing background information regarding a particular element in the video is a representative example of a serious engagement. The phrase “daily science education” (日常科普) is often used to start their additional background information. These seemingly objective and informative opinions, nevertheless, are subtle forms of subjective self-expression by users. By providing supplementary content to the video, these users believe that they have an influence on other viewers within

the community. Importantly, sharing knowledge with co-viewers produces a feeling that one has earned a place in the community. As a consequence of such contribution, their membership will be more meaningful and valuable.

Also, users may derive a sense of empowerment from making narcissistic expressions that focus on themselves rather than the videos. Such behaviours reflect the emotional safety and a sense of belonging provided by a community to its members. Comments revealing personal information clearly demonstrate such a tendency. For example, one user expressed that they had “just finished an exam.” Similarly, users like to rank themselves in terms of how early they came to watch the video. For example, “No. 1,” “No. 2,” and so forth, are marked on the screen by the users, typing themselves into virtual existence. Such off-topic practices turn the danmu space into a collective game board, encouraging viewers to experience a sense of immersion by jovially participating in the sequence of self-marking comments.

### 2.1.2. Danmu Comments with Specific Addressees

Danmu comments with specific addressees are typically written in response to one or more previous users. Although the connections between them are loose and less clear than those of threaded comments on other social sites, users have developed several linking expressions to establish connections with their addressees.

Directional symbols such as directional arrows are adopted to supplement such interactional needs. In the comment “← wrong,” the “←” is applied to pinpoint the targeted comment which is inserted at an earlier

point. This arrow makes the connection between the comments relatively clear. Although several other comments might also be positioned on the left, the arrow symbol still constructs a dialogue between this comment and the targeted comment based on the similarity of their content.

Lexical repetition is another technique commonly used by users to indicate their addressees. Users also often adopt the pattern “who said + lexical repetition” to avoid merely repeating content from the earlier content. Sometimes, a user may simply refer to the targeted comment as “the previous one,” or the name of the colour of the addressed comment, as in “the comment in red, well done.” However, referring to a comment by colour is not universally applicable, because most of the danmu comments remain in the default colour of white.

Internet buzzword “+1” is another type of linking phrase frequently used by users to express agreement with a previous comment. For example, a user points out “Putin walks like a super star.” This is followed by the comment “Star+1.” By entering “+1,” the user can say “I agree” or “me too” sufficiently and effectively. With the lexical repetition of “Star” as a reference, viewers can trace back which previous comment this one is agreeing with.

Sometimes, users choose conjunctions such as “because” and “so” to connect their comment to its addressee. With such linguistic and semiotic cues, users can specify with whom they are engaging. Also, linking phrases such as “correct” and “yes” are used to start comments expressing agreement.

Of course, linking phrases are not always necessary. Connections can be simply established based on the content of the comments. The question-and-answer comments are a prime example. For example, multiple answers may be prompted by a comment asking, “What vehicles can Putin drive [?]” This appears to be a common source of confusion among viewers, giving rise to speculation such as “fighter aircraft” and “submarine.”

These links established by the danmu users demonstrate the mutual influence among them. A previous

comment impresses another viewer, then stimulates a subsequent comment. As a result of being influenced by the previous comment, the latter commenter tries to connect with it. Despite being strangers to each other, this large group of participants creates a comfortable space in which to have relaxed and informal conversations about videos. They can challenge or support elements of, or the narratives contained within, the videos as they wish; often, in a ludic manner. Consequently, they become more attracted to the communities in which they feel that they are influential.

Users interact with their imagined interlocutors and usually do not expect a response. For them, what matters are the forthcoming viewers. Outspokenness is welcomed on Bilibili. In some respects, their communication over videos resembles playful collective gossip, in that they engage in random prattle regarding certain elements in the videos, giving both the users themselves and other viewers great enjoyment and “the comfort of validation” (Jones, 1980, p. 194). Such collective gossip generates a feeling of immersion for viewers by occupying their attention.

## 2.2. Danmu Language

In addition to the language practices mentioned above, in general, users have exploited various meaning-making strategies and semiotic resources, both verbal and non-verbal, in their communications (see Table 3). Such language practices reflect the discursive nature of computer-mediated communication in Web 2.0, which is often facilitated by the multimodality of the internet. In addition, Bilibili’s user base consists of adolescents and young adults, who welcome colourful language.

A total of around 42% of the danmu comments adopted special language resources, and the rest of danmu comments use plain Chinese. Among them, internet buzzwords were the most frequently observed category. These buzzwords included an array of creative language usages. “红红火火恍恍惚惚,” for instance, was used to express a loud laugh because all the

**Table 3.** Distribution of language type in danmu comments.

Verbal vs. Nonverbal	Language	Category	Number of Danmu Comments	Percentage in the Dataset	
Verbal	Chinese	Internet buzzwords	1,987	27.21%	
		Chinese dialects	156	2.14%	
		Transliterations	237	3.25%	
		Lexical repetition	98	1.34%	
		Conjunctions	125	1.71%	
	Foreign language	Foreign languages (e.g., English)	74	1.01%	
		English acronyms	53	0.73%	
		Code-mixing	105	1.44%	
	Nonverbal	Kaomojis		216	2.96%
		Directional symbols		68	0.93%

pinyin initials of these characters were “h,” homophonic with the initial pinyin of the laughing sound character “哈” (ha). “十动然拒” is a Chinese acronym, short for “十分感动仍然拒绝,” meaning “be deeply moved, but still reject.” Arabic numerals like “666” express the meaning of admiration because “6” (liu) sounds similar to “牛”(niu).

Other creative language usages have also been exploited by the commenters to make their communication enjoyable, such as “因吹丝停” (yinchuisiting), a transliteration of the English word “interesting.” “表情包get,” a code-mixing phrase, expresses the meaning “the facial expression of someone in the video is captured and saved as a sticker by screenshotting” by combining English word “get” and Chinese word “表情包” (sticker). While some usages are common practice for Chinese netizens, they are typically welcomed by Bilibili users for encoding funny and rich meanings in short expressions and being convenient to type.

Importantly, due to the popularity of ACG culture on Bilibili, users tend to demonstrate their familiarity with its meaning-making signs and expressions in their danmu language practices. Prominently, “萌” is widely used. Originally, “萌” (もえ, moe) is used by the Japanese ACG community to describe someone or something as lovable and cute. Because the kanji of “萌” also exists as a Chinese character, it has been adopted by Chinese ACG fans and has become a Chinese online vernacular term with similar meaning.

Kaomoji or “颜文字” in Japanese, which literally means “face character,” is also popular. Kaomojis are typed using a wide range of symbols and presented in a horizontal manner. For example, the kaomoji “( ◡ ◡ )” is comprised of two eyes closed, a mouth opened; and two parentheses representing the edges of a face to mimic a facial expression. The hands are represented by the symbols “\” and “/,” resembling the action of a person stretching out their hands and shrugging their shoulders. This kaomoji captures the body language which often accompanies the utterance “there is nothing I can do.” Kaomojis help commenters not only to convey complex meanings, usually related to feelings and emotions, but also to occupy a highly visible space on the screen.

Therefore, many language practices are common knowledge for Bilibili users because of their references to ACG culture. As nonusers lack that shared background information, such expressions are hard for them to fully understand. The homogenous interests and values derived from ACG products may foster a relatively high level of empathetic understanding and emotional attachment (Koh et al., 2003) to the user community. By constantly using such language practices, Bilibili users emulate and reinforce their “in-group identity” (Hsiao, 2015, p. 119) and create an invisible “boundary” (McMillan & Chavis, 1986, p. 14) to differentiate this virtual community from others. This language comprises a common symbol system that serves important functions in building and maintaining their sense of com-

munity (McMillan & Chavis, 1986). Individuals’ ability to utilise this language signals their membership in this online community.

Influenced by the ludic nature of this language, an increasing number of viewers are turning their attention to and becoming embedded in their respective communities. Playfulness is one of the important prerequisites for user satisfaction in consuming and participating in online communication (Xiang & Chae, 2021). The emotional pleasure that danmu commenters experience by employing playful languages reduces the social distance among them and enhances their immersion within the community. The collective use of this playful language produces a positive evaluation of and affection towards the community, as well as even a sense of loyalty to it.

### 2.3. Clusters of Danmu Comments

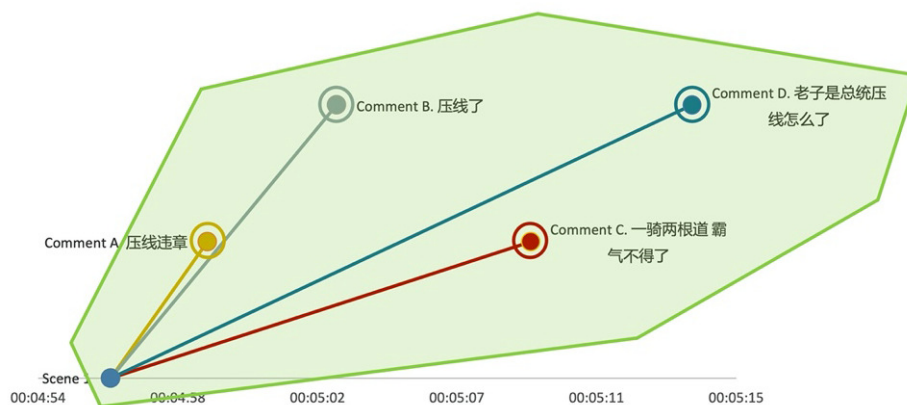
Another prominent interactive pattern of danmu comments is clustering. The effect is analogous to the noisy conversations that surround you when you walk into a pub. Although they may be overwhelming at first, eventually you find that people are clustered in small or large groups, discussing issues of interest to them. The clustering of danmu comments is equivalent to the physical gathering of a crowd. Both demonstrate the momentum of collective reactions, in that some comments coalesce around a certain element in the video.

In relation to exciting moments, viewers like to type comments as part of a collective to show their passion. Such a ritualistically communal practice enhances the emotional intensity of the particular moment, be it humorous, sad, or passionate. There are 198 danmu clusters in total throughout the 24 videos. The cluster sizes range from three comments to 78 comments. Sometimes, the volume of comments simultaneously posted on the video is large enough to obscure the entire screen, forming the visual effect of a danmu curtain. There are often multiple bursts of danmu clusters along the video timeline, although not all are on the scale of danmu curtains.

For example, this effect may be observed by a small danmu cluster made up of four comments in the dataset (Figure 2). These comments are shot onto the screen within several seconds and are topically related to a scene in which Putin’s motorcade is driving from his workplace in Moscow to the location of a ceremony he is attending when his car crosses the single solid line on the street.

Comment A pointed out “crossing the solid line, traffic offence.” Comment B raised the same issue, noting he “crossed the line.” Comment C made fun of the situation, saying “driving on two lanes, domineering exceedingly.” Comment D then appeared on the screen: “What’s wrong with crossing the line? I’m the president.” All four comments are rooted in the common awareness that drivers in China will be fined if they are caught by the police or on camera crossing the solid line on the road.





**Figure 2.** A graphic showing a small danmu cluster extracted from the dataset. Notes: The horizontal axis represents the video timeline and the vertical axis represents the height of the screen.

This indicates that danmu clusters are usually developed based on a certain pre-existing knowledge that is commonly held by the audience.

Whether Comment A begins this danmu cluster is in doubt. The first-in-first-out regulation of the danmu interface determines that the earliest comments are removed from the screen once the storage capacity of a video has been reached. Therefore, it would be difficult to identify whether this danmu cluster is inclusive of all the responses activated by the same cue in the video. The fact that a comment appears first in video time does not guarantee its actual chronological primacy.

Users rely on each other's comments as a reference when interpreting the videos, demonstrating the influential force of social interactions among community members. The comments posted on the analysed videos not only reflect the personal attitudes of the users towards the video, but also the influence of other users (Weisz et al., 2007). This herding effect, in turn, has an impact on the users' perception of the videos. Such a ritualistically communal performance, which collapses asynchronous behaviours into a seemingly simultaneous show of community, can reinforce a sense of unity in the user community. When users who share similar values, opinions, and sentiments form clusters, their emotional intimacy and connection generate a unifying force that leads to cohesive communities. Thereby, a sense of influence emerges from the clustering. Also, when a large danmu cluster occupies a prominent space on the screen, especially in the case of a bullet curtain, it invites the viewers to enjoy a flow of responses flying across the screen, facilitating their immersion into the community as well.

### 3. Concluding Remarks

Compared to other types of online commenting, the danmu interface allows its users to enjoy much greater flexibility and freedom to construct their social interactions. These unconnected viewers actively engage in multi-participant chats about the videos. The logic of socialising is integral to their behaviours and iden-

tities, unleashing a performative element within this co-viewing activity that is steeped in both playfulness and creativity. The ritualised ways in which Bilibili users communicate with each other and their aesthetic values differ greatly from other social sites. Probing into the interactive patterns of danmu comments, especially the social aims, clusters, and languages of danmu comments, this study shows that the high rate of collective commenting on Bilibili enhances users' sense of membership, influence, and immersion, contributing to the establishment and sustainability of a loosely connected community of interests. This study also contributes to the theory of SOVC by empirically testing the capability of the danmu interface on virtual community-building and suggests that the social interactions of users in homogenous and entertainment-oriented communities like Bilibili tend to have positive effects on the practice of community building, such as the playful languages of danmu which create a boundary for the Bilibili community.

However, the categories of social aims and language practices of danmu comments identified in this study are not inclusive due to limited sample size and this limitation warrants further investigation in order to produce statistically representative outcomes. We expect that this study can be applied to other danmu-enabled video sites with a heterogeneous user base, allowing the positive association between the social functionality of danmu interface and community-building to be further identified. Moreover, future studies could investigate the well-being of users, their positive perceptions of video content, and successful social and political mobilisation and collaboration within communities by examining the implications of the users' sense of belonging and self-empowerment derived from their involvement in virtual communities. Different research methods like interviews and netnography can be employed for further exploration.

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### Conflict of Interests

The author declares no conflict of interests.

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Article

## Election Fraud and Misinformation on Twitter: Author, Cluster, and Message Antecedents

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### Abstract

This study determined the antecedents of diffusion scope (total audience), speed (number of adopters/time), and shape (broadcast vs. person-to-person transmission) for true vs. fake news about a falsely claimed stolen 2020 US Presidential election across clusters of users that responded to one another's tweets ("user clusters"). We examined 31,128 tweets with links to fake vs. true news by 20,179 users to identify 1,069 user clusters via clustering analysis. We tested whether attributes of authors (experience, followers, following, total tweets), time (date), or tweets (link to fake [vs. true] news, retweets) affected diffusion scope, speed, or shape, across user clusters via multilevel diffusion analysis. These tweets showed no overall diffusion pattern; instead, specific explanatory variables determined their scope, speed, and shape. Compared to true news tweets, fake news tweets started earlier and showed greater broadcast influence (greater diffusion speed), scope, and person-to-person influence. Authors with more experience and smaller user clusters both showed greater speed but less scope and less person-to-person influence. Likewise, later tweets showed slightly more broadcast influence, less scope, and more person-to-person influence. By contrast, users with more followers showed less broadcast influence but greater scope and slightly more person-to-person influence. These results highlight the earlier instances of fake news and the greater diffusion speed of fake news in smaller user clusters and by users with fewer followers, so they suggest that monitors can detect fake news earlier by focusing on earlier tweets, smaller user clusters, and users with fewer followers.

### Keywords

diffusion; elections; fake news; situational theory of problem-solving; social networks

### Issue

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### 1. Introduction

Donald Trump and his followers falsely claimed that he won the 2020 US presidential election, sparking many of his supporters to repeat this fake news on social media (e.g., Twitter). Moreover, 88% of Trump supporters said that they would take action (e.g., protest; Pennycook &

Rand, 2021), and thousands of them joined the Capitol Insurrection, resulting in five deaths and over 140 casualties (Guynn, 2021).

Malevolent authors intentionally write false information (*disinformation*) for ideology or profit (paid per viewer or ad-click; Braun & Eklund, 2019), but unwitting traffickers can further disseminate it (*misinformation*;

Hilary & Dumebi, 2021). Indeed, laypeople have gathered in social spaces to share thoughts, consume and react to them, seek cooperation, and mobilize others for over two millennia at the agora (Athens in Ancient Greece), dinner parties, coffee houses, salons, reading circles, and now social media (*publics*; Dewey & Rogers, 2012; Grunig & Kim, 2017). Social media (e.g., Twitter) accelerates this process, enabling people to share ideas much faster than before, with many more people in larger networks with weak ties (Fuchs, 2014). Especially concerning, fake news can spread faster than true news via social media (Vosoughi et al., 2018)—and many people rely on social media for accurate news (Walker & Matsa, 2021), with sometimes devastating consequences, such as the Capitol Insurrection.

Like opinion leaders (e.g., politicians, celebrities) in traditional realms (Rogers & Cartano, 1962), online influencers can quickly broadcast information or (relatively slowly) cascade information person-to-person, potentially influencing audience activities and opinions (Mittal & Bhatia, 2019; Rossman et al., 2008). However, some discussions without influencers (low activity, few followers) still virally spread ideas (Rosenthal, 2014). These diffusion differences suggest differences across groups of users who respond to one another's messages (*user cluster*).

No published study has determined the antecedents of diffusion scope (*maximum adopters* or  $N_{max}$ ), speed (adopters over time or *adoption rate*), and shape (broadcast vs. person-to-person; or *external influence* vs. *internal influence*; Rossman et al., 2008) for true vs. fake news about a topic across different user clusters. Hence, we do so for 31,128 tweets with links to fake vs. true news about a stolen 2020 US presidential election shared by 20,179 users in 1,069 user clusters via multilevel diffusion analysis (MDA; Rossman et al., 2008). Specifically, we test whether attributes of authors (experience, followers, following, total tweets), time (date), or tweets (link to fake [vs. true] news, retweets) affect diffusion scope, speed, or shape.

## 2. Theoretical Framework of Diffusion Antecedents

First, we define diffusion scope, speed, and shapes (broadcast vs. person-to-person). Then, grounded in the situational theory of problem-solving (STOPS; Kim & Grunig, 2011), we examine motives for seeking, selecting, and sharing/forwarding a tweet, especially of fake vs. true news regarding a stolen 2020 US presidential election.

### 2.1. Diffusion

After a person invents an idea, product, or procedure, it may or may not spread to more users within a population (*diffusion*; Rossman et al., 2008). Diffusion can vary in scope, speed, and shape. The total number of users is diffusion *scope*. How quickly more people become users (the number of users divided by time) is diffusion *speed*.

Diffusion shapes differ in their extents of broadcast and person-to-person transmission. Many users might quickly engage with a tweet, with fewer additional people doing so over time, yielding a logarithmic-like cumulative distribution curve that rises quickly and then tapers off (*broadcast/external influence*; Rossman et al., 2008; see Figure A1 of the Supplementary File). Tweets by an influential person or institution typically show broadcast diffusion (e.g., Donald Trump, BBC news, etc.). By contrast, few initial adherents might engage with an attractive tweet by a low influence person, but as they proselytize it to others, its influence accelerates until the message saturates its target population, resulting in a cumulative distribution S-curve (*person-to-person/internal influence*; Rossman et al., 2008; see also Figure A2 of the Supplementary File).

### 2.2. Situational Theory of Problem-Solving

According to the STOPS (Kim & Grunig, 2011), humans ignore/discard most information, so they attend to and share only *relevant* novel information with their audience (Kim & Krishna, 2014). Their subjectivity in judging the relevance and integrity of true vs. false news hinders accurate detection. Even with training, most humans cannot identify fake news (Lutzke et al., 2019), especially as alternative media (e.g., *209 Times*) can publish 99% real news mixed with 1% fake news (Shaw & Natisse, 2021). People with less online media literacy are even less likely to accurately identify true vs. fake news (e.g., Brashier & Schacter, 2020).

#### 2.2.1. Cognitive Progression vs. Cognitive Retrogression

When facing a problem, a person can follow a scientific method: start with a minor premise and gather information/evidence to construct/determine a suitable solution/conclusion (evidence → conclusion: *cognitive progression*; Kim & Grunig, 2011). Or a person can begin with a solution/conclusion (belief) and gather confirming information/evidence (conclusion → evidence: *cognitive retrogression*; see Kim & Grunig, 2021; for *confirmation bias* see Knobloch-Westerwick et al., 2020). As cognitive retrogression includes both true and false evidence that mutually reinforce each other, the true parts help shield the false parts, thereby strengthening its overall credibility.

When a problem solver *improvises* conclusions (e.g., wishful or willful end state) or *activates recyclable* conclusions, facts, or solutions, cognitive retrogression is more likely than cognitive progression. Cognitive retrogression is the default cognitive mode in problem-solving (Fiske & Taylor, 1991; Kim & Grunig, 2021; Oakhill & Johnson-Laird, 1985). Cognitive retrogression in problem-solving explains why people continue to accumulate evidence that supports their beliefs (e.g., stolen election) and resist evidence that violates them (*cognitive arrest*; Kim & Grunig, 2011). So, cognitive



arrest drives fake news (e.g., cognitively arrested issue publics like QAnon or anti-vaxxers) and obstructs the cognitive progression of active publics.

### 2.2.2. Information Behaviors

Consider a Twitter user reading a tweet saying that Martians have landed in Tokyo and were chatting with his mom. Surprised and concerned about his mom, he imagines her deluged with tweets, forwards it to his siblings, and calls her—eventually finding that her friend wrote it to get her children to call her. According to the STOPS (Kim & Grunig, 2011; Kim et al., 2010), the user recognized a credible discrepancy between the tweet information and his experience/expectation (people had not previously tweeted that Martians chatted with his mom, *problem recognition*), his relation to this discrepancy (mom, *involvement recognition*), and few obstacles to addressing it (potential deluge of tweets, *constraint recognition*). All of these factors increased his epistemic motivation to increase problem-related communicative actions to seek and share information (call mom, forward to siblings; Kim et al., 2010).

#### 2.2.2.1. Problem Salience: Fake News Vs. True News

STOPS (Kim & Grunig, 2011; Kim et al., 2010) suggests three motives for seeking, selecting, and sharing/forwarding a tweet: problem salience, relationship, and scale. When a person perceives a greater sense of discrepancy between the current information and past experiences/future expectations (*problem salience*, cf. indeterminate situation; Dewey, 1910), this information might have a greater impact (whether potential benefit or threat), so they are more likely to disseminate this information to their user cluster who might also share the benefit or help address a threat.

As fake news typically differ more than true news from humans' experiences, people are more likely to share/forward fake news than true news to more people and do so more quickly via both broadcast and person-to-person diffusion. For example, as food poisoning in popular food franchises can harm a person's health, people are more likely to share such news with others (Lee et al., 2021). Indeed, fake news spreads to exponentially more people within a user cluster compared to true news (Abilov et al., 2021; Bodaghi & Oliveira, 2022; Bovet & Makse, 2019). Hence, we propose hypothesis H1:

H1: A tweet linked to a fake news story (rather than a true one) ignites *more* user cluster tweets on this topic (total users).

Compared to true news, such fake news (e.g., food poisoning) often elicits greater urgency, as indicated by more replies with surprise, fear, or disgust. Indeed, false information can spread 10 times faster than true information (Vosoughi et al., 2018). Also, a small number of influ-

encers in a network often spread most of the fake news (Grinberg et al., 2019; Sharma et al., 2020). Together, these studies suggest that fake news diffuse faster via broadcast transmission, compared to true news.

H2: A tweet linked to a fake news story (rather than a true one) *quickly* ignites tweets on this topic within its user cluster (broadcast transmission).

In addition to immediate broadcast action on fake news, we propose that users are more likely to share the often-alarming fake news with family members, friends, and acquaintances (person-to-person transmission).

H3: A tweet linked to a fake news story (rather than a true one) elicits more person-to-person sharing.

#### 2.2.2.2. Relationship

At the cluster level, the number of people in a user cluster (size) can also affect diffusion scope, speed, and shape. As larger user clusters have more people who respond to one another's messages, more people are likely to engage with a specific tweet.

H4: A tweet in a larger user cluster ignites *more* tweets on this topic within its user cluster (total users).

In smaller user clusters, people have closer relationships (e.g., immediate family members), so they often engage with one another's concerns quickly (Kim & Grunig, 2011). In smaller user clusters, members can devote more time and attention to each member (vs. attention dilution in larger user clusters) and care more about each person. Thus, they are more likely to engage with one another's concerns and do so quickly.

H5: A tweet in a smaller user cluster *quickly* ignites tweets on this topic within its user cluster (broadcast).

By contrast, people in larger user clusters are less likely to respond immediately. Instead, we propose that as more people in a large user cluster engage with a tweet, person-to-person engagement increases.

H6: A tweet in a larger user cluster elicits more person-to-person sharing.

#### 2.2.2.3. Scale

At the user-level, an author with more Twitter followers (*scale*) has greater motivation to send them tweets to maintain their followers (Kim et al., 2010). Given the larger number of followers compared to other authors, more of them are likely to engage.

H7: A tweet by an author with more followers ignites *more* tweets on this topic within its user cluster.

However, these many tweets might dilute the value of each tweet, so any specific tweet might be less likely to be relevant to each person, resulting in less immediate engagement.

H8: A tweet by an author with more followers slowly ignites tweets on this topic within its user cluster.

Instead, followers are more likely to wait for others to engage before they do. As more people engage with a tweet, their participation suggests that the tweet has greater value, which in turn elicits greater engagement from more user cluster members.

H9: A tweet by an author with more followers elicits more person-to-person sharing.

### 2.2.3. Other Explanatory Variables

As omitting significant explanatory variables from a statistical model can cause *omitted variable bias* (Cinelli & Hazlett, 2019), we also model these available variables: followers, following, tweets, author experience, total date, and retweets. As noted above, users with more followers often send out more tweets, so these variables are likely highly correlated. Users with more experience (days since user account creation date) might have more status, credibility, and authority, which suggests more total engagement, faster broadcast diffusion, and less person-to-person diffusion (Chiu, 2008).

H10: A tweet by an author with more experience ignites *more* tweets on this topic within its user cluster.

H11: A tweet by an author with more experience *quickly* ignites tweets on this topic within its user cluster.

H12: A tweet by an author with more experience elicits less person-to-person sharing.

As the value of news degrades over time, late tweets on later days might attract less engagement, with unclear effects on diffusion speed or shape (broadcast or person-to-person).

H13: A tweet at a later date ignites *fewer* tweets on this topic within its user cluster.

As retweets, replies, and new tweets on a topic are possible substitutes for one another, the effect of total retweets is unclear. See the summary of hypotheses in Table 1.

### 3. Method

To address our research questions, we identified tweets regarding the election, downloaded tweets linked to them, identified subsequent tweets that engaged with each original tweet within user clusters and analysed their diffusion patterns.

#### 3.1. Data

To create the Twitter election fraud data set, we first identified true vs. fake news articles regarding election fraud in the 2020 US Presidential Election from October 24 to December 18, 2020. We first selected the news items identified as false or mostly false on *Snopes* (<https://www.snopes.com>), which included the archived links of fake news sources. Then, we identified true news articles from mainstream news websites. These results yielded 48 related news articles from news media such as *The New York Times*, *AP News*, *Reuter*, and *USA Today* (true news) and 43 from *Snopes* (identified fake news). We downloaded tweets during October 24 to December 18, 2020, with their URLs (linked to these news articles) and their replies, which capture interactions within user clusters. For example, each tweet contains the ID information of users who have retweeted. Through this process, we collected 3,340 tweets about true news articles on election fraud and 3,410 tweets about fake news articles on the same topic.

**Table 1.** Diffusion hypotheses (all supported except the ~~strikethrough~~ one).

Theory	Explanatory Variable	Scope	Expected Outcome	
			Speed/Broadcast Shape	Person-to-Person Shape
Problem salience (H1, H2, and H3)	Fake news	More	Faster	More
Relationship (H4, H5, and H6)	Larger user cluster	More	Faster	More
Scale (H7, H8, and H9)	Author has more followers	More	Slower	More
Author experience (H10, H11, and H12)	More experience	<del>More</del>	Faster	Less
Date (H13)	Later date	Fewer		

Notes: The results supported all hypotheses except for greater author experience yielding more scope; we have no hypotheses regarding Date’s effects on diffusion speed or person-to-person shape.

### 3.1.1. User Cluster Detection

For this article, we broadly operationalize a user cluster as users who interact on a specific issue on a social media network (Leicht & Newman, 2008). So, we specify how we used *clustering* to identify each user cluster that interacts and reacts to fake (or true) news on the 2020 election fraud.

#### 3.1.1.1. Transform Data to Determine User Clusters

First, we transform Twitter data into a suitable format to represent network structures (see Table 2). The “tweet\_id” is a unique value identifying a tweet. Similarly, “user,” “text,” and “retweeted\_user” indicate its author, its text message, and a user who retweeted it, respectively. Also, an author refers to a specific user in a message via the @ symbol in the “text” field. These data also include dates and time.

#### 3.1.1.2. Construct the Weighted, Directed Network

We divided tweet interactions into three categories: mention, retweet, and self (see Table 3). A tweet can name a specific user in its text via “@” (*mention*). Also, a user can retweet a tweet. A user can respond to

one’s prior tweet (*self*). As this study examines diffusion across people, we excluded self-tweets. Table 4 shows the number of interactions between users (excluding self-tweets) as the sum of mentions and retweets. The above data transformation enables identification of weighted, directed social networks of user *nodes*, and interaction *edges* (Fortunato, 2010), as shown in Figure A4 of the Supplementary File. Each node represents a user, and arrows indicate source-to-target relations, with thicker arrows reflecting more interactions.

#### 3.1.1.3. Clustering Analysis

We detected broadly defined user clusters by decomposing them into smaller subsets of interrelated users (Fortunato & Castellano, 2007) via their network structure information (see review by Azaouzi et al., 2019; some studies use community quality indicators, but we lack this information). Node *i* is in our weighted, directed user cluster  $c_i$ , and the strength of edges within a user cluster compared to other edges (*modularity*; Arenas et al., 2007) is:

$$Q = \frac{1}{2m} \sum_{i,j} \left( A_{ij} - \frac{k_i^{\text{out}} k_j^{\text{in}}}{2m} \right) \delta(c_i, c_j) \quad (1)$$

**Table 2.** Sample Twitter data.

Tweet_id	User_id	Text	Retweeted_user
100	user1	to @user2 and @user3	user3, user5
101	user6	no mention	None
102	user1	to @user3	None
103	user9	no mention	user10

**Table 3.** Interactions between users.

Source	Target	Type
user1	user2	mention
user1	user3	mention
user1	user3	retweet
user1	user5	retweet
user6	user6	self
user1	user2	mention
user9	user10	retweet

**Table 4.** Merged edges for each user relationship.

Source	Target	Count
user1	user2	2
user1	user3	2
user1	user5	1
user9	user10	1

The weight of the edges between  $i$  and  $j$  is  $A_{ij}$ . The total weight from node  $i$  is  $k_i^{out} = \sum_{\forall j} A_{ij}$ . The total weight to node  $j$  is  $k_j^{in} = \sum_{\forall i} A_{ij}$ . For nodes  $i$  and  $j$  within a user cluster, the indicator function  $\delta(c_i, c_j)$  has value 1; otherwise, 0. The total strength is  $m = \frac{1}{2} \sum_{\forall i,j} A_{ij}$ . When the actual edges in a user cluster exceed their expected number of randomly distributed edges (see Equation 1), modularity is positive.

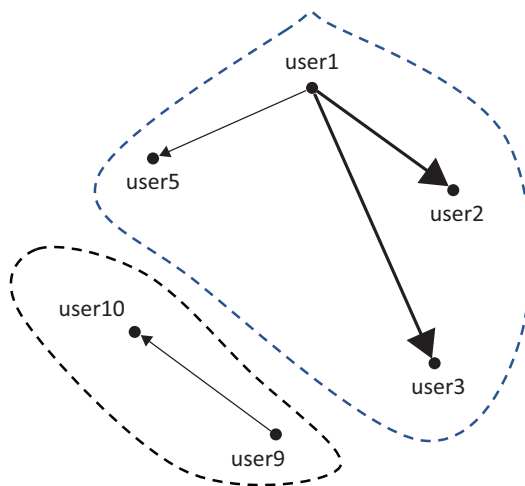
Optimizing clustering by maximizing modularity detects user clusters (Srinivas & Rajendran, 2019). As exact optimization of larger networks requires exponentially more time, we use Blondel et al.'s (2008) heuristic via *Gephi* software (Cherven, 2015; see Figure 1). Users 1, 2, 3, and 5 are in one group, and users 9 and 10 are in another group.

$$A_{12} = 2, A_{13} = 2, A_{15} = 1, A_{910} = 1,$$

$$m = \frac{1}{2} (A_{12} + A_{13} + A_{15} + A_{910}) = 3,$$

$$k_1^{out} = 5, k_2^{out} = k_3^{out} = 2, k_5^{out} = k_9^{in} = k_{10}^{out} = 1,$$

So, optimal modularity  $Q^*$  is 0.278.



**Figure 1.** Support for and institutionalization of direct democracy. Source: Geissel (2016).

### 3.1.1.4. Online User Clusters

In tweets about true news articles, 12,241 users formed 655 user clusters. In the tweets about fake news articles, 7,938 users formed 414 user clusters. See visualization of the interactions among users in Figure 2 for a view of the overall network structure. Dots represent users, and those in the same cluster have the same color. These clustering results identify the online community of each user.

If a tweet was only visible on two days during this period, there are two days in which others can respond to it (two *tweet-days*). For each subsequent day (1–55) of each of the 6,750 initial tweets (resulting in 235,088 *tweet-days*), we counted the daily number of references to it.

### 3.1.2. Statistical Power

Statistical power differs across levels. For  $\alpha = 0.05$  and a small effect size of 0.1, statistical power is 0.91 for 1,096 user clusters, and exceeds 0.99 for 20,179 users, 31,128 tweets, 6,750 initial tweets, and 235,088 *tweet-days* (Konstantopoulos, 2008).

### 3.2. Variables

*Cumulative tweets* is the number of tweets engaging with an initial tweet, inclusive, to date. We also computed its squared term *cumulative tweets*<sup>2</sup>. Both are needed for a diffusion analysis. Author variables include author experience, total tweets, followers, and following. *Author experience* is computed as the number of days between the author creation date on Twitter and the date of the last tweet in the dataset (December 19, 2020). As total tweets, followers, and following have non-normal distributions, we computed  $\log(\text{total tweets} + 1)$ ,  $\log(\text{followers} + 1)$ , and  $\log(\text{following} + 1)$ . The followers and following reflect the size of the user cluster. *Date* is the number of days from the first tweet in the data set (first date = 1). *Fake* indicates a tweet about fake (vs. true) news, in which the original tweet in this thread linked to a news article identified as fake on *Snopes*. *Retweets* is the number of retweets of the first tweet in a thread.

### 3.3. Multilevel Diffusion Analysis

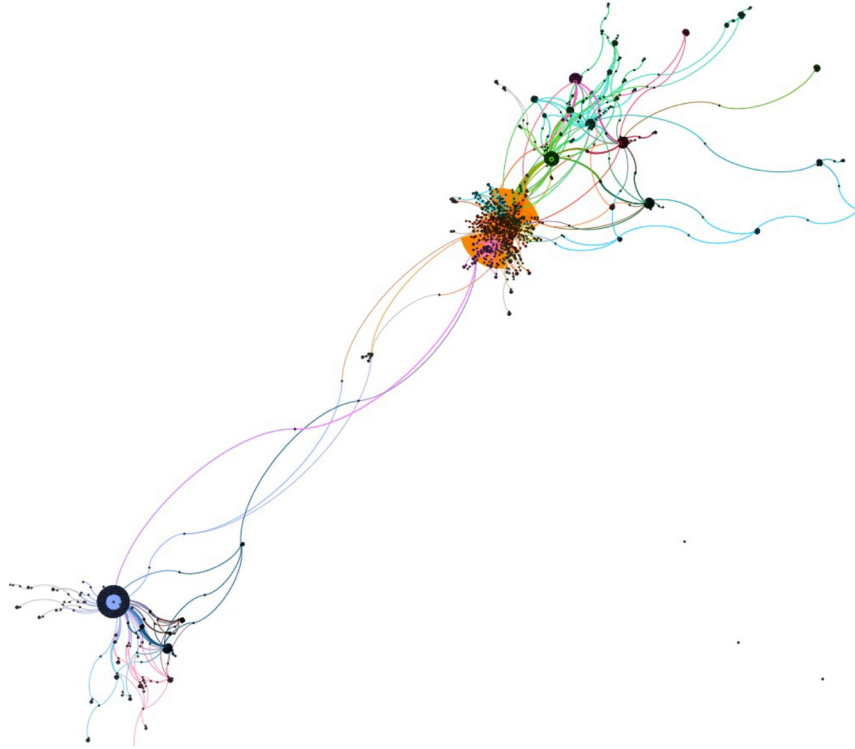
To address our research questions with these data, we integrated *diffusion analysis* and *multilevel analysis* into MDA (Rossman et al., 2008). Diffusion analysis models the scope, speed, and shape (broadcast vs. person-to-person) of the dissemination of a tweet (Franz & Nunn, 2010). As tweets in the same user cluster likely resemble one another more than those in different user clusters (*nested data*), a traditional diffusion analysis underestimates the *standard errors*, so we use a multilevel analysis (Hox et al., 2017), specifically an MDA (Rossman et al., 2008).

#### 3.3.1. Explanatory Model

MDA simultaneously models (a) diffusion of multiple tweets within multiple user clusters, (b) the expected total diffusion of a tweet (total adopters), (c) the extent of its broadcast transmission (*external influence*) vs. its person-to-person transmission (*internal influence*), and (d) explanatory variables at user cluster-, tweet-, and time-levels. We begin with a *variance components* model.

$$N_{k(t+1)i} - N_{kti} = A_k + e_{kti} + f_{ki} + g_k \quad (2)$$

$N_{kti}$  and  $N_{k(t+1)i}$  are vectors of the numbers of members in user cluster  $k$  that have sent tweet  $i$  by day  $t$  and day  $t + 1$ , respectively, so the difference  $N_{k(t+1)i} - N_{kti}$  is the number of new tweets sent on day  $t + 1$ . The grand mean



**Figure 2.** Identified user clusters with fake tweets (414 user clusters).

intercept is  $A_k$  with unexplained components (*residuals*) at the time-, tweet-, and user cluster-levels:  $e_{kti}$ ,  $f_{ki}$ , and  $g_k$ . To model the diffusion shape (broadcast vs. person-to-person), we add the linear term  $N_{kti}$  and its quadratic term  $N_{kti}^2$  in the following equation:

$$N_{k(t+1)i} - N_{kti} = (A_k + e_{kti} + f_{ki} + g_k) + (B_{k1i})N_{kti} + (C_{k2i})N_{kti}^2 \quad (3)$$

$B_{k1i}$  and  $C_{k2i}$  are regression coefficients of  $N_{kti}$  and  $N_{kti}^2$ , respectively. The internal influence ( $b$ ) in user cluster  $k$  of tweet  $i$  is as follows:

$$b_{ki} = -C_{k2i} \quad (4)$$

We compute the expected total diffusion ( $N_{max}$ ) in user cluster  $k$  of a tweet  $i$  as follows:

$$N_{max,ki} = -B_{k1i} / 2C_{k2i} \pm (B_{k1i}^2 - 4 \times A_k \times C_{k2i})^{0.5} / 2C_{k2i} \quad (5)$$

We compute the external influence ( $a$ ) in user cluster  $k$  of tweet  $i$  as follows:

$$a_{ki} = (A_k \times 2 \times C_{k2i}) / (-B_{k1i} \pm [B_{k1i}^2 - 4 \times A_k \times C_{k2i}]^{0.5}) \quad (6)$$

Next, we add explanatory variables:

$$N_{k(t+1)i} - N_{kti} = (A_k + e_{kti} + f_{ki} + g_k + \pi_w \text{AUTHOR}_k + \phi_{kzi} \text{TIME}_{kti} + \alpha_{kx} \text{TWEET}_{ki}) + (B_{k1i} + \theta_w \text{AUTHOR}_k + \kappa_{kzi} \text{TIME}_{kti} + \beta_{kx} \text{TWEET}_{ki}) N_{kti} + (C_{k2i} + \rho_w \text{AUTHOR}_k + \lambda_{kz} \text{TIME}_{kti} + \gamma_{kx} \text{TWEET}_{ki}) N_{kti}^2 \quad (7)$$

$\text{AUTHOR}_k$ ,  $\text{TIME}_{kti}$ , and  $\text{TWEET}_{ki}$  are vectors of explanatory variables that might influence the diffusion in user cluster  $k$  of tweet  $i$ , with regression coefficients:  $\pi_w$ ,  $\alpha_{kx}$ ,  $\phi_{kzi}$ ,  $\theta_w$ ,  $\beta_{kx}$ ,  $\kappa_{kzi}$ ,  $\rho_w$ ,  $\gamma_{kx}$ , and  $\lambda_{kz}$ .  $\text{AUTHOR}$  captures the characteristics of the author of the initial tweet on this topic (in this case, stolen US presidential election in 2020): twitter experience (days), log (followers + 1), log (following + 1), and log (total tweets + 1).  $\text{TIME}$  is the date of the initial tweet of this topic.  $\text{TWEET}$  includes the following attributes: link to a fake news article (vs. true one), and log (retweets + 1). To test the robustness of our results, we repeated the above analyses on the following subsets: (a) user clusters with at least two tweets, (b) user clusters with at least 50 members, and (c) user clusters with at least 100 members.

#### 4. Results

These 20,179 users in 1,069 user clusters sent 31,128 total tweets (see Table 5). There were 6,750 initial tweets (3,340 linked to fake news, 3,410 linked to true news) that ignited conversations. The mean length of these conversations lasted 35 days (6,750 tweets  $\times$  ~35 days  $\approx$  235,088 tweet-days). For most days in these user clusters, there were no additional tweets on this stolen election topic ( $M = 0.029$ ), and the number of cumulative tweets on this topic to date was small ( $M = 1.075$ ). The author of the first tweet in a user cluster about this topic averaged 6.8 years ( $M = 2,489$  days) of experience on Twitter, 32,595 total tweets, 5,713 followers, and 2,078 followings. A tweet was retweeted slightly more than



**Table 5.** Summary statistics (N = 235,088 days across tweets or *tweet-days*).

Variable	Mean	SD	Min	Median	Max
Additional tweets today	0.029	0.674	0	0	185
Cumulative tweets today	1.075	9.693	0	1	798
Author days of experience	2,489.223	1489.202	22	2,763	5,256
Total tweets	32,595.298	65,459.397	1	11,427	1,040,402
Followers	5,712.902	45,571.701	0	468	2,101,420
Following	2,077.980	6,157.396	0	757	195,749
Log (total tweets + 1)	9.196	1.760	0.693	9	13.855
Log (followers + 1)	6.144	2.214	0	6	14.558
Log (following + 1)	6.526	1.606	0	7	12.185
Date <sup>a</sup>	39.756	11.102	1	19	55
Fake	0.588	0.492	0	1	1
Retweets	1.157	14.101	0	0	610
Log (retweets + 1)	0.188	0.556	0	0	6.415
Isolated tweet	0.745	0.436	0	1	1

Notes: 31,128 total tweets with 6,750 initial tweets (3,340 fake, 3410 true) across ~35 days in 1,069 user clusters with 20,179 users (6,750 tweets × ~35 days ≈ 235,088 tweet-days); <sup>a</sup> the first possible date was October 24, 2020 (October 24 = 1; October 25 = 2; etc.).

once on average ( $M = 1.157$ ). Nearly 60% of these tweets were linked to fake news articles. On any given day, over 25% of these tweets had at least one reply or retweet.

Users with more experience tweeted earlier than other users and had somewhat more tweets, followers and following (correlations [ $r$ ] = 0.27, 0.31, 0.38, and 0.32 respectively; see correlation matrix in Table 6), showing more influence than users with less experience. Users with many followers often followed many others ( $r = 0.67$ ) and wrote many tweets ( $r = 0.77$ ). Initial tweets about fake news were sent earlier than those with true news ( $r = 0.33$ ); otherwise, no other attributes were linked to fake news.

#### 4.1. Explanatory Model

Most of the differences in diffusion of tweets varied across dates within a user cluster (89%), with significant differences across user clusters (11%; see Table 7). The multilevel diffusion regression showed that both *cumulative tweets* and its squared term *cumulative tweets*<sup>2</sup> were significantly linked to additional tweets today (on the topic of the stolen US presidential election 2020; see Table 7). Also, nearly all their interactions with the explanatory variables—author days of experience, log (followers + 1), log (following + 1), and log (total tweets + 1), date, fake, log (retweets + 1)—were significant. All interactions of fake news with log (followers + 1) and log (following + 1) were not significant.

Thus, we enter these significant regression coefficients into our above diffusion equations to yield the results shown in Table 8. These results project an over-

all mean of 233 tweets for each original tweet, indicating that 233 subsequent tweets mentioned the original message author, retweeted, or replied to each original message, on average. Both broadcast and person-to-person diffusion were small overall, with much larger impacts of other explanatory variables on both types of diffusion. Together, they indicate that these tweets have no overall, common diffusion pattern. Instead, author, date, and tweet differences determine diffusion scope, speed, and shape (broadcast or person-to-person).

##### 4.1.1. Scope

Author, date, and tweet attributes were linked to the expected total tweets on the topic of a stolen 2020 US presidential election. Authors with more experience ignited far fewer expected total tweets on this topic in their user cluster (−0.205 per day of Twitter experience, 75 fewer tweets per year of Twitter experience), rejecting hypothesis H10 (see Tables 1 and 8). By contrast, authors with more tweets, more followers, or following more users ignited slightly more expected total tweets on this topic in their user cluster (0.829, 0.068, or 0.726, respectively), supporting H4 and H7. Tweets igniting this topic in a user cluster on later dates yielded fewer expected total tweets (−0.222 per day, ~ −7 per month), supporting H13. Tweets with links to fake news rather than true news yielded over 32 more expected total tweets, supporting H1. Additional retweets of the original tweet on this topic in a conversation yielded slightly fewer expected total tweets (−0.011).

**Table 6.** Correlation-variance–covariance matrix of key variables in the lower left, diagonal, and upper right matrices.

Variable	1	2	3	4	5	6	7	8	9	10
1 Number of tweets (t + 1)	<b>0.454</b>	1.405	664.110	1.945	0.013	0.012	0.016	−0.003	−0.035	0.005
2 Cumulative tweets	0.215	<b>93.951</b>	55,602.938	39.201	0.410	0.380	0.530	−0.038	−3.913	0.169
3 Cumulative tweets <sup>2</sup>	0.158	0.922	<b>38,701.959</b>	41,245.653	178.170	157.846	190.561	−41.264	−121.612	−9.179
4 Days of experience	0.002	0.003	0.004	<b>2,217.713</b>	806.838	772.117	1,265.506	−196.298	986.039	87.345
5 Log (total tweets)	0.011	0.024	0.016	0.308	<b>3.097</b>	1.641	2.616	−0.094	0.144	0.180
6 Log (following)	0.011	0.024	0.016	0.323	0.580	<b>2.580</b>	2.737	−0.121	0.177	0.199
7 Log (followers)	0.011	0.025	0.014	0.384	0.671	0.770	<b>4.904</b>	−0.242	0.511	0.551
8 First date	−0.008	−0.008	−0.013	−0.268	−0.109	−0.153	−0.222	<b>0.242</b>	−1.827	−0.030
9 Fake	−0.005	−0.036	−0.002	0.060	0.007	0.010	0.021	−0.334	<b>123.261</b>	−0.083
10 Log (retweets)	0.012	0.031	−0.003	0.106	0.184	0.223	0.448	−0.109	−0.013	<b>0.309</b>

**Table 7.** MDA results (with 1,000 multiplier).

Explanatory variable	Regressions predicting additional tweets today							
	Model 1		Model 2		Model 3		Model 4	
Cumulative tweets	27.940	***	27.970	***	-80.910	***	-526.100	***
	(0.604)		(0.605)		(7.985)		(13.130)	
Cumulative tweets <sup>2</sup>	-0.060	***	-0.060	***	-0.191	***	69.290	***
	(0.001)		(0.001)		(0.001)		(0.646)	
Author days of experience			-0.002		-0.019	***	0.024	***
			(0.004)		(0.004)		(0.004)	
Log (followers + 1)			0.283		4.202		-9.987	*
			(4.431)		(5.255)		(4.475)	
Log (following + 1)			2.282		-9.231		-28.000	***
			(4.914)		(5.830)		(4.978)	
Log (total tweets + 1)			2.765		-12.150	**	-19.690	***
			(3.847)		(4.556)		(3.879)	
Date			0.336		-0.704		-0.329	
			(0.469)		(0.556)		(0.471)	
Fake			-14.060		96.570	***	21.960	*
			(11.090)		(13.160)		(11.090)	
Log (retweets + 1)			-6.855		69.730	***	92.010	***
			(10.230)		(12.190)		(10.370)	
Author days of experience × Cumulative tweets					0.021	***	-0.034	***
					(0.001)		(0.001)	
Log (total tweets + 1) × Cumulative tweets					18.340	***	29.710	***
					(0.498)		(1.170)	
Log (followers + 1) × Cumulative tweets					-12.450	***	7.599	***
					(0.576)		(1.190)	
Log (following + 1) × Cumulative tweets					17.680	***	39.740	***
					(0.628)		(1.322)	
Date × Cumulative tweets					-2.612	***	2.766	***
					(0.160)		(0.192)	
Fake × Cumulative tweets					-149.800	***	4.531	
					(2.861)		(3.591)	
Log (retweets + 1) × Cumulative tweets					-18.210	***	-51.570	***
					(0.590)		(1.341)	
Author days of experience × Cumulative tweets <sup>2</sup>							0.001	***
							(0.000)	
Log (total tweets + 1) × Cumulative tweets <sup>2</sup>							0.192	***
							(0.014)	
Log (followers + 1) × Cumulative tweets <sup>2</sup>							-0.307	***
							(0.011)	
Log (following + 1) × Cumulative tweets <sup>2</sup>							(0.356)	***
							(0.011)	
Date × Cumulative tweets <sup>2</sup>							(1.667)	***
							(0.015)	
Fake × Cumulative tweets <sup>2</sup>							(29.260)	***
							(0.261)	
Log (retweets + 1) × Cumulative tweets <sup>2</sup>							0.381	***
							(0.018)	
Variance at each level								
User cluster (11%)	0.000		0.000		0.000		0.000	
Date (89%)	0.037		0.037		0.117		0.180	
Total variance explained	0.033		0.033		0.104		0.160	

Notes: To aid the reading of small values, all regression coefficients and standard errors were multiplied by 1,000; \*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$ .

**Table 8.** Diffusion parameter results.

	Expected Total Tweets ( $N_{max}$ )	Broadcast $\times$ 100 ( $a$ , external) <sup>a</sup>	Person-to-Person $\times$ 100 ( $b$ , internal) <sup>a</sup>
Overall	232.807	0.001	0.006
Author experience (days)	-0.205	0.253	-0.018
Log (total tweets + 1)	0.829	-0.551	-0.018
Log (followers + 1)	0.068	-0.221	0.019
Log (following + 1)	0.726	-0.571	0.023
Date	-0.222	0.017	0.661
Fake	32.483	0.124	2.916
Log (retweets + 1)	-0.011	0.065	-0.001

Note: <sup>a</sup> As some broadcast and person-to-person influences were small, all results in this column were multiplied by 100 to aid reading.

#### 4.1.2. Speed/Broadcast

Author, date, and tweet attributes were linked to broadcast diffusion of this topic in their user cluster. Authors with more experience yielded the fastest diffusion (broadcast; +0.00253 per day of Twitter experience, +0.923 per year of Twitter experience), supporting H11. By contrast, authors with more tweets, more followers, or following more users showed slightly less broadcast diffusion on this topic in their user cluster (-0.00551, -0.00221, or -0.00571, respectively), supporting H5 and H8. Tweets initiating this topic in a user cluster on later dates yielded slightly more broadcast diffusion (0.00017 per day). Tweets with links to fake news rather than true news yielded slightly more broadcast diffusion (0.00124), supporting H2. Lastly, additional retweets of the original tweet on this topic in a conversation yielded slightly more broadcast diffusion (0.00065).

#### 4.1.3. Person-to-Person

Author, date, and tweet attributes were also linked to person-to-person diffusion of this topic in their user cluster. Authors with more experience showed less person-to-person diffusion (-0.00018 per day of Twitter experience, -0.0657 per year of Twitter experience), supporting H12. Likewise, authors with more tweets showed slightly less person-to-person diffusion (-0.00018). By contrast, authors with more followers or following more users showed slightly more person-to-person diffusion (0.00019 or 0.00023, respectively), supporting H6 and H9. Tweets starting this topic in a user cluster on later dates yielded the largest person-to-person diffusion (0.00661 per day, 0.19830 per month). Tweets with links to fake news rather than true news yielded much more person-to-person diffusion (0.02916) than broadcast diffusion (0.00124), supporting H3. Lastly, additional retweets of the original tweet on this topic in a conversation yielded slightly less person-to-person diffusion (-0.00001). Analyses of data subsets yielded similar results, suggesting their robustness.

## 5. Discussion

This is the first study to determine the antecedents of diffusion scope (total audience), speed (audience/time), and shape (broadcast vs. person-to-person) for true vs. fake news about a topic (stolen 2020 US presidential election) across different user clusters. Grounded in STOPS (Kim & Grunig, 2011), we hypothesized that fake (vs. true) news, user cluster size, followers, user experience, and date affect diffusion scope, speed, and shape. After examining 31,128 tweets, we identified 1,096 user clusters via *clustering analysis* (Srinivas & Rajendran, 2019), and tested our hypotheses with MDA (Rossman et al., 2008), thereby showcasing a new methodology for studying diffusion of messages (such as fake news) within user clusters. Our results showed an expected diffusion of each of these tweets to 233 people but no overall diffusion speed or shape for tweets. Instead, the above explanatory variables account for differences in scope, speed, and shape, mostly supporting our hypotheses (the results did not support significant interactions between fake news and user cluster size).

### 5.1. Fake News

Tweets linked to fake news started earlier, showed much greater diffusion scope, faster dissemination (broadcast), and more person-to-person transmission than tweets linked to true news. These results not only support those of earlier studies (e.g., Abilov et al., 2021; Vosoughi et al., 2018) but also extend them via more accurate measures of diffusion shape (some broadcast with mostly person-to-person transmission) and controlling for the impacts of other author, user cluster, date, or tweet attributes. Together, they show the many advantages of fake news tweets over true news tweets and highlight the need for pro-active measures to counter-act diffusion of fake news by focusing on earlier tweets. As no other user, user cluster, or tweet attributes were correlated with fake news (all  $|r| < 0.02$ ), we need future studies with other explanatory variables that might affect fake news diffusion.

### 5.2. User Cluster Size

The results for numbers of followers and following aligned with our hypotheses that smaller user clusters show more intimacy and urgent concerns, resulting in faster broadcast diffusion but less scope and less person-to-person diffusion (Kim & Grunig, 2011). These results pinpoint a size trade-off between greater diffusion scope against slower diffusion speed. Furthermore, they suggest that the effects of social media user cluster size on interactions and diffusion resemble those of face-to-face user cluster size (Dunbar, 1996). User cluster size was not related to likelihood of fake news, so both fake news and true news tend to diffuse faster in smaller user clusters than in larger user clusters. Hence, monitors aiming for early detection of fast-spreading fake news should focus on smaller user clusters rather than larger user clusters.

### 5.3. Scale

The results supported the scale hypotheses that users with more followers send them more tweets to maintain their followers (Kim et al., 2010), and more of their followers engage with them but are less likely to immediately engage with any specific tweet (slower diffusion speed, less broadcast) and more likely to wait for other followers to engage before engaging themselves (more person-to-person engagement). Like user cluster size, more followers show a trade-off between greater diffusion scope against slower diffusion speed. These results apply for both fake and true news. Hence, monitors seeking early detection of quickly diffusing fake news should focus on users with fewer followers rather than those with many followers.

### 5.4. User Experience and Date

Authors with more experience showed greater diffusion speed (broadcast) and less person-to-person transmission (supporting both hypotheses) but had substantially smaller diffusion scope (rejecting our hypothesis). The greater broadcast diffusion and less person-to-person diffusion cohered with status effects (Chiu, 2008). The surprisingly smaller diffusion scope might stem from the illegitimacy of this topic of a falsely claimed stolen election. Future studies can test whether higher status, experienced people are less likely to engage substantially with an illegitimate topic and more likely to do so with a legitimate topic.

As expected, tweets on later dates showed less scope, supporting the claim that they lose audience to earlier tweets. Later tweets showed a slightly faster diffusion speed (broadcast) and the largest person-to-person diffusion of these explanatory variables. Future studies on other topics over longer time spans can test whether this result applies more generally across topics and discern its mechanism(s).

### 5.5. Limitations and Future Research

This study's limitations include its single topic, limited user clusters, single social media platform, limited time period, and limited explanatory variables. This study examined diffusion scope, speed, and shape for only one topic across a limited set of user clusters on one social media platform, Twitter, for 55 days; so, future studies can examine more topics, more user clusters, on more platforms for longer time periods. As this study tested few explanatory variables regarding each tweet, user, or user cluster, future studies can gather and test more information about each tweet, user, or user cluster. For example, this study did not consider whether subsequent tweets supported or rejected the original tweet, so future studies can examine whether supportive versus opposing tweets differ in their diffusion scope, speed, or shape. Also, this study tested few user attributes or behaviors, so future studies can do so in fine-grained detail. Likewise, future studies can collect more data on each user cluster and determine more structural attributes (e.g., degree of centrality). Adding these attributes to our model can improve our understanding of the antecedents of diffusion scope, speed, and shape.

## 6. Conclusion

Diffusion of tweets regarding a falsely claimed stolen 2020 US presidential election showed no overall diffusion pattern; instead, specific explanatory variables determined these tweets' diffusion scopes, speeds, and shapes. Tweets linked to fake news rather than true news started earlier, showed much greater diffusion scope, faster dissemination (broadcast), and more person-to-person transmission, highlighting the importance of pro-active countermeasures for fake news by focusing on earlier tweets, smaller user clusters, and users with fewer followers.

Smaller user clusters showed less scope and less person-to-person diffusion but faster broadcast diffusion. A user with many followers typically sends them many tweets, but with only slightly more scope, less speed, and slightly more person-to-person diffusion. Hence, both larger user cluster size and more followers trade off greater diffusion scope for slower diffusion speed. Authors with more experience showed greater diffusion speed (broadcast) and less person-to-person transmission but smaller diffusion scope. Tweets on later dates showed less diffusion scope, slightly faster diffusion speed (broadcast), and more person-to-person transmission.

Notably, these results highlight the greater diffusion speed of fake news in smaller user clusters and by users with fewer followers. Hence, they imply that monitors seeking to detect fake news early should focus on earlier tweets, smaller user clusters, and users with fewer followers.



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## Conflict of Interests

All authors declare no conflict of interests.

## Supplementary Material

Supplementary material for this article is available online in the format provided by the author (unedited).

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Article

## Homophily and Polarization in Twitter Political Networks: A Cross-Country Analysis

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### Abstract

Homophily, the tendency of people to have ties with those who are similar, is a fundamental pattern to understand human relations. As such, the study of homophily can provide key insights into the flow of information and behaviors within political contexts. Indeed, some degree of polarization is necessary for the functioning of liberal democracies, but too much polarization can increase the adoption of extreme political positions and create democratic gridlock. The relationship between homophilous communication ties and political polarization is thus fundamental because it affects a pillar of democratic regimes: the need for public debate where divergent ideas and interests can be confronted. This research compares the degree of homophily and political polarization in Catalan MPs' Twitter mentions network to Dutch MPs' Twitter mentions network. Exponential random graph models were employed on a one-year sample of mentions among Dutch MPs ( $N = 7,356$ ) and on a one-year, three-month sample of mentions among Catalan MPs ( $N = 19,507$ ). Party polarization was measured by calculating the external–internal index of both Twitter mentions networks. Results reveal that the mentions among Catalan MPs are much more homophilous than those among the Dutch MPs. Indeed, there is a positive relationship between the degree of MPs' homophilous communication ties and the degree of political polarization observed in each network.

### Keywords

homophily; parliamentarians; political networks; political polarization; political communication; Twitter

### Issue

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### 1. Introduction

Homophily is the principle asserting that “the contact between similar people occurs at a higher rate than among dissimilar people” (McPherson et al., 2001, p. 416). It describes a fundamental characteristic of social networks and uncovers a mechanism through which “distance in terms of social characteristics translates into network distance” (McPherson et al., 2001, p. 416). Simply put, homophily argues that one is more likely to have ties with similar people than with dissimilar people (Himmelboim et al., 2013).

It is claimed that homophily is an empirical regularity in social life (Kossinets & Watts, 2009), which “limits people's social worlds in a way that has powerful implications

for the information they receive, the attitude they form, and the interactions they experience” (McPherson et al., 2001, p. 415). In their path-breaking research, Lazarsfeld and Merton (1954, p. 24) divided homophily into two different types: “status-homophily” and “value-homophily.” Status-homophily comprises both ascribed characteristics (e.g., age, sex, race, social class, and ethnicity) and acquired characteristics (e.g., occupation, religion, and education); value-homophily refers to the association with others with similar attitudes, values, and beliefs.

The literature suggests that homophily often characterizes communications among users on social media. An early study conducted by Adamic and Glance (2005) found that political bloggers prefer to establish connections (hyperlinks) with blogs with similar political

views. Researching MySpace, Thelwall (2009) found substantial evidence of homophily for ethnicity, religion, age, country, marital status, attitude towards children, sexual orientation, and reason for joining the platform. On Facebook, Wimmer and Lewis (2010) showed that racial homogeneity results from racial homophilic ties among users, and Barnett and Benefield (2015) found cultural homophily to be one of the causes of international Facebook friendship networks. Similarly, several studies conducted on Twitter have shown that communications among individuals with shared sociodemographic characteristics and political attitudes are more likely to happen than with dissimilar individuals (Esteve-Del-Valle et al., 2021; Himelboim et al., 2013; Hong & Kim, 2016).

Contrary to popular belief, homophily can have positive effects on political behavior. Prior work shows that political homophily provokes dense clusters of within-group ties that put pressure on participating in costly or risky political activities (Centola, 2013). Indeed, political homophilous networks have a significant advantage in facilitating political actions which require social confirmation, such as attending political protests, engaging in discussion about controversial topics, or turning out to vote (Esteve-Del-Valle & Bravo, 2018a, 2018b; González-Bailón et al., 2011; Romero et al., 2011). Political homophily may also help insulate individuals “from exposure to false or offensive information” (Boutyline & Willer, 2016, p. 552).

However, political homophily can also have harmful consequences. Previous research reveals that individuals with low cross-cutting ideological exposure are less likely to see opposing viewpoints as legitimate and less able to build their own arguments (Huckfeldt et al., 2004). These individuals are more likely to hold extreme political attitudes (Huckfeldt et al., 2004) and be less tolerant than people with ties to others who hold different political views (Mutz, 2002). Increased political homophily is, therefore, a source of political discord and polarization (Boutyline & Willer, 2016; Esteve-Del-Valle & Bravo, 2018a; Himelboim et al., 2013), whereas individuals’ network heterogeneity is found to nurture political tolerance (Scheufele et al., 2006).

Despite the interest in studying political homophily on social media, research into how social network sites affect communication among parliamentarians (Hong & Kim, 2016; Nuernbergk & Conrad, 2016; van Vliet et al., 2020) is slim. Furthermore, the study of political homophily in online parliamentary networks (Koiranen et al., 2019; Mousavi & Gu, 2015) is still only in its infancy, even though MPs are at the core of political life and have the mandate to represent people’s interests and concerns in national assemblies. The research presented here aims to narrow this gap by studying whether Twitter mentions among Catalan parliamentarians and among Dutch MPs are homophilous. Furthermore, it investigates the relation between the degree of homophily (or heterogeneity) among the Catalan and Dutch parlia-

mentarians’ mentions, at a dyad level, with the degree of political polarization in both networks, at a network level.

The term “political polarization” is used here to characterize the extent to which interactions (mentions) in the Dutch MPs’ Twitter mentions network occur only among members of the same parliamentary group or across groups. The degree of party polarization is assessed at both the parliamentary level and the whole Twitter mention network level.

The article asks the following research questions:

RQ1: To what extent do mention ties among Catalan MPs and among Dutch parliamentarians show homophily?

RQ2: Is there a relation between the degree of homophily among Catalan MPs’ mentions and among Dutch MPs’ mentions and the degree of political polarization in each of the parliamentary mentions’ networks?

Around one year of samples of all the mentions among Catalan ( $N = 19,507$ ) and Dutch MPs ( $N = 7,356$ ) were collected. Both datasets were gathered during non-electoral periods because the aim of the two independently conducted investigations was to assess MPs’ communication behavior during ordinary legislative sessions. During these sessions, parliamentarians are expected to create more alliances with colleagues of different parliamentary groups to support specific views on political issues. This is especially important in multi-party systems such as the Catalan and the Dutch examples. Among the different communication layers on Twitter (relations, retweets, and mentions), this research focuses on MPs’ mentions because this network is expected to better reflect cross-party and cross-ideological connections (Esteve-Del-Valle et al., 2021). Indeed, previous research has revealed that politicians actively use mentions to converse (Esteve-Del-Valle et al., 2020; van Vliet et al., 2020).

Catalonia and the Netherlands offer two excellent case studies. In terms of the use of Twitter, usage rates among Catalan (85%) and Dutch MPs (96%) were very high and relatively similar. Furthermore, both political contexts are parliamentary democracies in which the formation of the government depends on the support of the parliament. This encourages MPs to negotiate to gain the support of other parliamentary groups (at times ending up in coalitions) for a government to be formed. Certainly, polarization is a threat to these negotiations. Secondly, both countries have proportional electoral laws with low electoral thresholds (3% in Catalonia and 0.6% in the Netherlands), which facilitate the entry of smaller parties to parliament with relative ease. This has resulted in seven medium-sized and fringe parties filling the 135 seats of the Parlament de Catalunya (Catalan parliament) and 11 parties occupying the 150 seats of the



Twede Kamer (Dutch parliament). In these fragmented systems, where continuous negotiations are needed to reach agreements, polarization—making it more difficult to reach these agreements—can reduce legislatures to a gridlock. However, for the goals of this research, this political fragmentation is beneficial as it allows us to test hypotheses related to political homophily and polarization in different political systems other than the two-party system of the US, which is largely overrepresented in the research samples. In addition, this comparison sheds unprecedented light on the similarities and differences concerning the degree of homophily and polarization in two European parliamentary Twitter networks.

The main contributions of this article are as follows: First, this appears to be the first time that a cross-country comparison of the degree of homophilous ties in Twitter parliamentary networks has been conducted. Therefore, the results of this comparison provide unprecedented insights into the state of political homophily in online parliamentary networks. Second, the methods employed here (ERG models and external-internal [E-I] index) combine explanations at the dyad and network levels. Providing explanations at both levels is important to establish the relationship between dyadic homophily and network homophily, when existent. In addition, it allows us to overcome an important limitation of previous research in the field, that is, the analysis of political homophily either at one level of analysis (dyad) or at the other (network). Third, the present analysis not only assesses the degree of political homophily and polarization independently but also establishes a relation between both phenomena. Despite the explanatory power of such a combination, research trying to combine both phenomena is in its early stages (Esteve-Del-Valle & Bravo, 2018a; Esteve-Del-Valle et al., 2021).

## 2. Literature Review

Political theorists have long considered dialogue between people holding dissimilar views a key prerequisite for sustaining a democratic citizenry (Habermas et al., 1989; Mill, 1859). Mill held that individuals' engagement with political disagreement helps develop skills to critically evaluate one's political claims and better justify ideas. Likewise, Arendt (1961, p. 241) contended that debate "constitutes the very essence of political life," without which it is impossible to form "enlightened political opinions that reach beyond the limits of one's own subjectivity to incorporate the standpoints of others" (Boutyline & Willer, 2016, p. 1). Besides these normative arguments, exposure to people with different views is important because it can profoundly impact "individuals' beliefs—and their strengths" (Barberá, 2020, p. 10). Individuals' network heterogeneity has been found to increase political tolerance (Scheufele et al., 2006), while exposure to like-minded people is associated with the adoption of extreme positions (Mutz & Paul, 2001).

If the use of social media exposes people to like-minded viewpoints and prevents contact between different groups, it can also be expected to strengthen people's political beliefs and increase political polarization. However, empirical research on the consequences of the use of social media on political polarization is slim and offers mixed results. This study contributes to clarifying these contradictory results.

### 2.1. Reciprocity: A Network-Endogenous Mechanism

Reciprocity, the likelihood of vertices in directed networks to be mutually linked, is a well-documented mechanism in the formation of communication ties in Twitter political networks. Yoon and Park's (2014) early study of South Korean politicians' interactions on the following-follower network and on the mentions' network used reciprocity to ascertain the factors explaining politicians' communication ties. However, they did not find the reciprocity effect significant in either network. In contrast, Esteve-Del-Valle and Bravo (2018b) found that reciprocity explained the existence of communication ties in Catalan MP's following-follower Twitter network. Similarly, Hekim (2021) also found mutuality explained retweets among Turkish politicians. Taking into account the findings of previous literature, reciprocity among the Catalan and the Dutch MPs' mentions is expected to explain the communication ties between the parliamentarians. Thus, the following hypothesis is proposed:

H1: The reciprocity in the Catalan MPs' mention Twitter network and the Dutch MPs' Twitter mentions network is assumed to significantly explain communication ties among the members of each network.

### 2.2. Network-Exogenous Mechanisms

#### 2.2.1. Status-Homophily

On Twitter, the findings of previous studies on parliamentary networks suggest that status-homophily explains the formation of communication ties. Comparing the mentions and retweet networks of 370 US House Representatives, Mousavi and Gu (2015) found that gender homophily explained the communications among them. More specifically, they found that female representatives were more likely to mention and retweet other female representatives. In Catalonia, research on the factors explaining relationships (following-follower) among the Catalan parliamentarians conducted by Esteve-Del-Valle and Bravo (2018b) also found that gender homophily explained the existence of ties among the MPs. However, in the Catalan case, male MPs were more likely to establish communication relationships with other male MPs. Indeed, this study suggested that MPs' political position (being a leader of a political party) and age (being an older MP) increased

parliamentarians' likelihood of establishing communication ties. In a similar vein, Koiraenen et al.'s (2019) study of Finish MPs' following–follower Twitter network found the same gender to have a slight positive effect on relations formed by parliamentarians, and that parliamentarians' likelihood of following each other decreased with the age difference. More recently, the study conducted by Esteve-Del-Valle et al. (2021) on the Twitter communication behavior of Dutch MPs shows that MPs' age, gender, and participation in the parliamentary commissions explain the formation of Twitter communication ties among them. Specifically, young and female MPs, highly engaged with the work in the chamber, are more likely to receive mentions than the rest of parliamentarians. Given prior research findings concerning the existence of status-homophily in parliamentary Twitter networks, the following hypotheses are proposed:

H2 (gender homophily): Catalan and Dutch MPs are highly likely to mention Catalan and Dutch MPs of the same gender.

H3 (age homophily): Young (26–44 years) Catalan and Dutch MPs are highly likely to mention other young Catalan and Dutch MPs.

H4 (leadership position homophily): Catalan and Dutch MPs in leadership positions are highly likely to mention other Catalan and Dutch MPs in leadership positions.

### 2.2.2. Value-Homophily

Prior research has found ideological homophily to be present in Twitter communication networks. An early study conducted by Conover et al. (2011) on political hashtags some weeks before the US congressional midterm elections revealed that retweets replicated the known partisan split in the online world, while interactions in the mention network showed contacts among ideologically opposed individuals. Yoon and Park's (2014) study of Korean politicians' use of Twitter revealed high degrees of homophily in the following–follower network, while in the mention network interactions between politicians with different ideologies occurred more often. Colleoni et al.'s (2014) investigation of homophily in US Twitter politics found that, in general, Democrats exhibited higher levels of political homophily. However, Republicans who followed official Republican accounts showed higher levels of homophily than Democrats. In the overall communication network of Twitter, Gruzd and Roy's (2014) analysis of 5,918 tweets on the 2011 Canadian federal election revealed a clustering effect around shared political views among supporters of the same party, but also some "evidence of cross-ideological discourse" (Gruzd & Roy, 2014, p. 38). More recently, Koiraenen et al.'s (2019) research found that Finish MPs (left–right) stance concerning socioeconomic issues sig-

nificantly explained followee connections between the parliamentarians. In sum, given that previous research shows that ideological homophily explains the formation of communication ties in Twitter political networks, the following hypothesis is proposed:

H5 (ideological homophily): Catalan and Dutch MPs are highly likely to mention other Catalan and Dutch MPs with the same political ideology.

### 3. Data and Methods

Twitter mentions from Catalan and Dutch MPs were collected. The Twitter accounts of 116 Catalan parliamentarians were scraped to retrieve all the MPs' mentions (19,507) from January 1, 2013, to March 31, 2014. As for the Dutch MPs, Coosto (<https://www.coosto.com/en>) was used to collect a one-year sample of all tweets (131,963) posted by 144 Dutch MPs from November 3, 2015, to November 3, 2016. The adjacency matrix of MPs' mentions was then created using a Python script that filtered out tweets in which MPs mentioned other MPs. This resulted in a total network of 7,356 mentions among Dutch legislators.

UCINET, a software package for the analysis of social network data (Borgatti et al., 2002), was used to obtain the descriptive statistics of the network. Gephi, an open-source network exploration and manipulation software, was used to visualize the networks (Bastian et al., 2009). Furthermore, ERG models (see Lusher et al., 2012) were employed to find out the network characteristics (reciprocity) and the MPs' attributes (ideology, political position, age, and gender) that explain the degree of homophily in the communication ties (mentions) among the Catalan and Dutch parliamentarians, respectively.

ERG models are "tie-based models for understanding how and why social network ties arise" (Lusher et al., 2012, p. 9). The goal of the ERG models is to "generate a large set of random networks based on a chosen set of network properties and node attributes from the observed network" (Gruzd & Tsyganova, 2015, p. 131).

This procedure allowed us to see if the presence of homophilous communication ties in the Catalan and Dutch Twitter mentions networks was due to chance, or if it was due to network properties and MPs' attributes, and which of these network properties and node attributes influenced the formation of these ties.

ERG models were employed by using the "statnet" suite of packages in R (Goodreau et al., 2008), which includes the package "ergm.count" (Krivitsky, 2021), employed here to fit the ERG models to the two weighted parliamentary mention networks. First, a null model without any predictors ( $net \sim edges$ ) was built. Following the null model, and in line with prior literature (Hekim, 2021; Yoon & Park, 2014), a model was created using the parameter of reciprocity, a basic estimator (cf. Shumate & Palazzolo, 2010) of communication tie formation in online networks ( $net \sim edges + mutual$ ). Since the

study's main goal was to evaluate the existence of status-homophily and value-homophily, that is, the influence of MPs' attributes on their mentioning behavior, the decision of using one network parameter was considered to be the most appropriate.

Different MPs' attributes were then added to Model 1. These attributes were chosen based on prior research findings in the field, as mentioned in the literature review. First, the ideology (left–right; Catalonia:  $M = 0.48$  and  $SD = 0.5$ ; the Netherlands:  $M = 0.42$  and  $SD = 0.49$ ) of the parliamentarians was added (*net ~ edges + mutual + nodematch [Ideology]*; Model 2). This was followed by the addition of the political position (Catalonia:  $M = 0.18$  and  $SD = 0.38$ ; the Netherlands:  $M = 0.21$  and  $SD = 0.41$ ) of the MPs (*net ~ edges + mutual + nodematch [PolPos]*; Model 3). In the final iteration, two MPs' sociodemographic characteristics were added: age (Catalonia:  $M = 45.46$  and  $SD = 9.01$ ; the Netherlands:  $M = 46.76$  and  $SD = 8.32$ ) and gender (Catalonia:  $M = 1.41$  and  $SD = 0.494$ ; the Netherlands:  $M = 0.6$  and  $SD = 0.49$ ). To determine the quality of the resulting model, randomly generated networks were compared to the observed networks by assessing the goodness of fit of the ERG models in plots (Hunter et al., 2008; Li & Carriere, 2013). Following Hunter et al. (2008), to assess the goodness of fit of the models, the in-degree statistic, and the geodesic distance statistic were employed.

The description of the network parameter and the nodes' attributes, the adjacency matrix of the Catalan MPs' Twitter mentions network and of the Dutch MPs' mention Twitter network, and the files containing the attributes of the Catalan and the Dutch MPs are available online (see Supplementary File).

Moreover, the degree of homophily among Catalan MP's mentions and among the Dutch MPs' mentions was compared to the degree of polarization in both networks. To do so, UCINET was used to calculate the E-I index. This is a measure of group embedding created by Krackhardt and Stern (1988) based on analyzing the number of ties inside and between groups. It divides the total number of ties by the number of ties that group members have to outsiders, minus the number of ties that group members have to other group members. The resulting index ranges from  $-1$  (all ties are internal to the group) to  $+1$  (all ties are external to the group). A permutation test is used to determine whether a given E-I index value differs considerably from what would be predicted by random mixing (i.e., no preference by group members for links within or outside the group; the default is 5,000 trials).

## 4. Political Characteristics

### 4.1. Catalonia

Catalonia was experiencing an unprecedented political context when the data was collected, with demands for an independence referendum. These demands pushed

Catalan parties to position themselves in favor of or against Catalan independence, which fueled political polarization in the region. The Catalan party system was divided into a number of medium-sized parties following the November 25, 2012 elections: Convergence and Union (CiU), Republican Left of Catalonia (ERC), Socialist Party of Catalonia (PSC), People's Party of Catalonia (PP), ICV-EUiA, Citizens (C's), and Candidacy of Popular Unity (CUP). CiU is a Catalan nationalist center-right party. In the 2012 elections, it won 50 seats. ERC is a pro-independence, left-wing party. In the elections, it gained 21 seats. PSC won 20 seats in the 2012 elections. The PP is a right-wing Spanish nationalist party that won 19 seats in the recent election. ICV-EUiA is a left-wing eco-socialist party that won 13 seats in the election. C's is a moderate and non-Catalan-nationalist party that gained nine seats. CUP is a far-left, pro-independence coalition that gained three seats in the 2012 election. Furthermore, the Catalan party system was divided into two ideological groups: leftists and rightists, as well as Catalan nationalists and non-Catalan nationalists.

### 4.2. The Netherlands

Following the September 12, 2012 elections, the Dutch party system was divided into 11 medium-sized and fringe groups, occupying 150 seats in parliament. The People's Party for Independence and Democracy (VVD) is a right-wing liberal party that emphasizes self-determination and freedom (van Herk et al., 2018). It gained 41 seats in the 2012 elections. The Labour Party (PvdA) is a progressive and social democratic party. It obtained 38 MPs. The PVV (15 seats) is a nationalistic, populist party with conservative and rightist ideals. It is also an anti-immigrant, anti-Islam, and anti-European party. It gained 15 MPs. The Socialist Party (SP) is a left-wing socialist and Eurosceptic party. It gained 15 seats. The Christian Democratic Appeal (CDA) is a conservative, centrist party with 13 MPs. Democrats 66 (D66) is a reformist social, liberal party with 12 seats. The Christian Union (CU), with five seats, is a Christian democratic party with more conservative Christian principles than the CDA but more progressive social ideas. The Green Party (GL), with five seats, is a social-democratic left-wing party that focuses on environmental problems. The Reformed Political Party (SGP) is a right-wing conservative protestant Christian party with three seats. The Party for the Animals (PvdD), a social-democratic party dedicated to animal rights and welfare, and the 50Plus party (50Plus), which advocates for the concerns of retirees, each hold two seats.

## 5. Network Characteristics

In the case of the Catalan MPs' Twitter mentions network, 116 MPs tweeted a total of 19,507 mentions, while in the case of the Dutch MPs' Twitter mentions network, 144 parliamentarians tweeted a total of 7,356 mentions.

The descriptive network statistics of both the Catalan and the Dutch MPs' Twitter mentions networks are summarized in Table 1.

The descriptive statistics of both networks reveal some similarities but also some important differences between the networks. As is common in most online networks, a small number of parliamentarians attracts and sends most of the mentions, thus the maximum values,  $\text{Max}(K_{in}) = 1,409$  (Catalonia) and 204 (the Netherlands), and the  $\text{Max}(K_{out}) = 773$  (Catalonia) and 361 (the Netherlands), compared to the mean degree ( $d = 25.750$  in Catalonia, and  $d = 15.354$  in the Netherlands), are indicative of the underlying long tails distribution. In addition to the dissimilar activity in the networks (Catalonia = 19,507 mentions; the Netherlands = 7,356 mentions), the descriptive network statistics show a much lower density for the Catalan MPs' mentions network (0.224) than for the Dutch parliamentarians' mentions network (0.341). This means that, while in the Catalan network, only 22.4% of the total mentions among the parliamentarians occurred, in the Netherlands network, 34.1% of the possible total mentions among the parliamentarians took place. Despite the differences in the densities of the networks, the average path length of both networks (Catalonia = 1.867; the Netherlands = 2.191) is similarly low, revealing that the average distance between the MPs is 1.867 and 2.191 steps, respectively. Thus, although the density in the networks is quite low, notably in the Catalan network, the short distances between the MPs make it possible for them to connect to others easily. Lastly, the modularity scores reveal that the Catalan MPs' Twitter mentions network is much more fragmented than the Dutch parliamentarians'. Both networks can, however, be classified as being tight crowd and affiliation networks. They are tight crowd networks because they have between two and six clusters (with modularity scores of 0.548 in the case of the Catalan network and 0.286 in the case of the Dutch network) and few isolates (Hansen et al., 2011, p. 8). These characteristics belong to the so-called affiliation networks (Borgatti et al., 2016). Given its partisan and ideological nature, this is the typical network type to be expected in online legislative networks (Esteve-Del-Valle & Bravo, 2018b).

## 6. Results

### 6.1. Results of the Exponential Random Graph Models

Table 2 summarizes the results of the ERG models (Model 4) for the Catalan MPs' and the Dutch MPs' Twitter mentions networks. The information criterion was driven by significance levels, the Akaike information criterion and the Bayesian information criterion.

The first column of the table reports the estimates of the baseline model (Model 1) containing the arc and the full specification of endogenous network effects (mutuality). The edge parameter is negative for both networks, a common characteristic of sparse networks (see Mai et al., 2015). The estimates indicate that reciprocity (mutuality) is positive and significant ( $p < 0.001$ ) for the Catalan MPs' Twitter mentions network ( $EST = 2.042$ ;  $SE = 0.069$ ), whereas for the Dutch parliamentarians' the network is positive ( $EST = 0.140$ ;  $SE = 0.096$ ) but not significant.

Model 2 adds to the MPs' network endogenous parameters their ideology (left–right). The estimates of this node attribute are positive and significant ( $p < 0.001$ ) for the left ( $EST = 1.079$ ;  $SE = 0.004$ ) and for the right ideology ( $EST = 0.423$ ;  $SE = 0.004$ ) in the Catalan parliamentarians' Twitter mentions network, whereas for the Dutch MPs' network the estimates are negative and significant ( $p < 0.01$ ) for the left ideology ( $EST = -0.184$ ;  $SE = 0.004$ ) and non-significant for the right ideology ( $EST = 0.073$ ;  $SE = 0.050$ ). In line with these estimates, which can be interpreted as conditional log-odds ratios, left and right ideology positively affect Catalan MPs' homophilic communication ties. For instance, holding a left ideology increases the MPs' odds of mentioning an MP holding the same ideology (all else being equal) by about 100%. In contrast, in the Dutch parliamentarians' Twitter network, holding a left ideology decreases the likelihood of mentioning MPs with the same ideology by 18.4%, revealing a much more heterogeneous communication behavior than observed in the Catalan network. These different degrees of ideological homophily (left–right) can also be visually observed in the network visualization shown in Figure 1.

The Catalan MPs mentions' Twitter network (116 nodes and 2,987 edges) is displayed on the left, and

**Table 1.** Descriptive network statistics of the Catalan and the Dutch MPs' Twitter mentions network.

	Catalan MPs' Twitter Mentions Network	Dutch MPs' Twitter Mentions Network
$N$ (number of vertices)	116	144
$E$ (number of directed edges)	2,987	2,211
$d$ (mean degree)	25.750	15.354
$\text{Max}(K_{in}$ ; maximum indegree)	1,409	204
$\text{Max}(K_{out}$ ; maximum outdegree)	773	361
Graph density	0.224	0.341
Average path length	1.867	2.191
Modularity (Newman & Girvan, 2004)	0.548	0.286



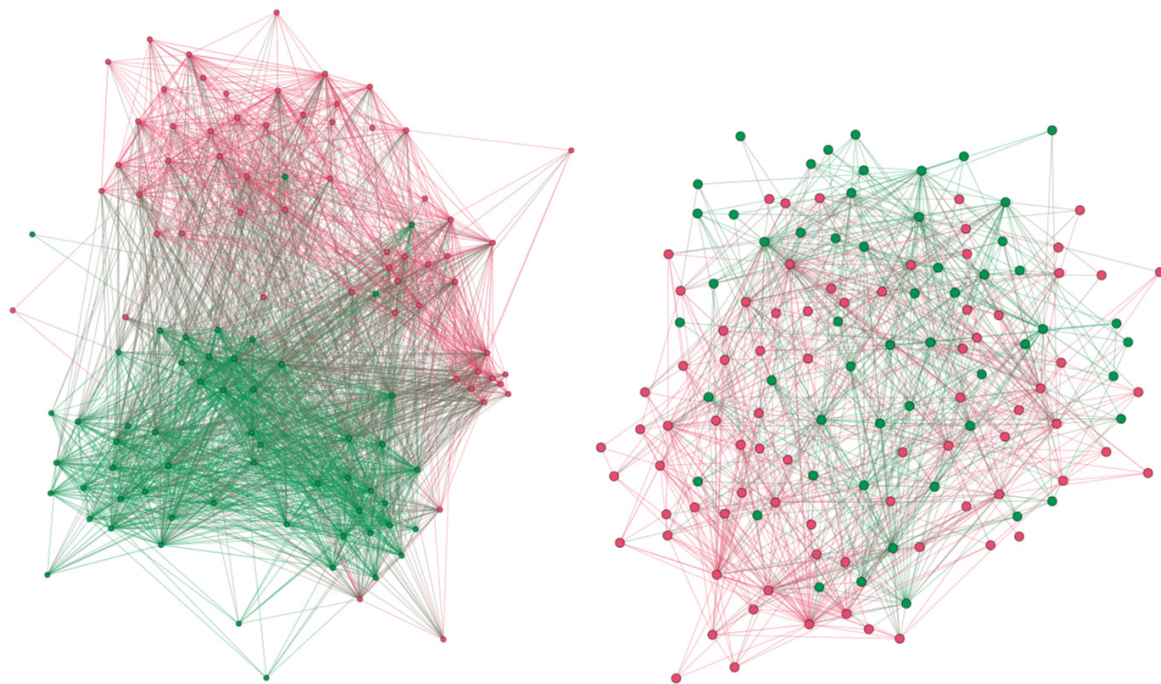
**Table 2.** Factors underlying communication flows in the Catalan and Dutch MPs’ Twitter mentions networks: Models 1–4.

	Catalan MPs		Dutch MPs	
	<i>EST</i>	<i>SE</i>	<i>EST</i>	<i>SE</i>
<i>Structural Features (Model 1)</i>				
Edges	-2.465***	0.061	-2.141***	0.056
Mutuality	2.042***	0.069	0.140	0.096
<i>Ideology (Model 2)</i>				
Left	1.079***	0.004	-0.184**	0.069
Right	0.423***	0.004	0.073	0.050
<i>Political Position (Model 3)</i>				
No Leader	0.083*	0.044	0.114	0.052
Leader	0.008	0.103	-0.203	0.125
<i>Sociodemographic Characteristics (Model 4)</i>				
Age (26–44)	0.515***	0.047	0.149*	0.060
Age (45–59)	-0.356***	0.055	-0.032	0.005
Age (≥60)	-0.753*	0.304	-0.219	0.282
Gender (Male)	0.037	0.048	-0.057	0.066
Gender (Female)	0.017	0.053	0.113*	0.050
<i>Akaike Information Criterion</i>	14,213		14,185	
<i>Bayesian Information Criterion</i>	14,228		14,272	

Notes: \*  $p < 0.05$ ; \*\*  $p < 0.01$ ; \*\*\*  $p < 0.001$ ; *EST* = Estimates; *SE* = Standard Error.

the Dutch MPs mentions’ Twitter network (114 nodes and 2,211 edges) is displayed on the right. The Force Atlas 2 algorithm, which pulls together nodes that are connected by ties, was used to generate both visualizations. The color of the nodes represents the MPs’ ideology (left = green; right = red). The size of the nodes has been standardized for visualization purposes. In the

Catalan parliamentarians’ network, two differentiated clusters of interaction can be observed, showing that most of the mentions in the network occur between MPs holding the same ideology. Conversely, in the Dutch MPs’ network, parliamentarians holding different ideologies are closely located in the graph, revealing the existence of many more cross-ideological interactions.



**Figure 1.** Mentions between left–right Catalan MPs (left network) and between left–right Dutch MPs (right network).



Model 3 adds to the previous model the MPs' political position as a possible explanation of the homophilic communication ties (mentions) among Catalan parliamentarians and among Dutch MPs. Controlling for the endogenous network effect (mutuality), the estimates for the Catalan MPs' Twitter mention network ( $EST = 0.083$ ;  $SE = 0.044$ ) suggest a significant ( $p < 0.05$ ) and positive homophilic communication behavior among the parliamentarians who do not hold political leadership positions, while for those holding a political position the estimates ( $EST = 0.114$ ;  $SE = 0.052$ ) are not significant. Concerning the Dutch MPs' Twitter mentions network, both estimates, those of the parliamentarians not holding a political leadership position ( $EST = 0.008$ ;  $SE = 0.103$ ) and those of the MPs holding these positions ( $EST = -0.203$ ;  $SE = 0.125$ ) are not significant.

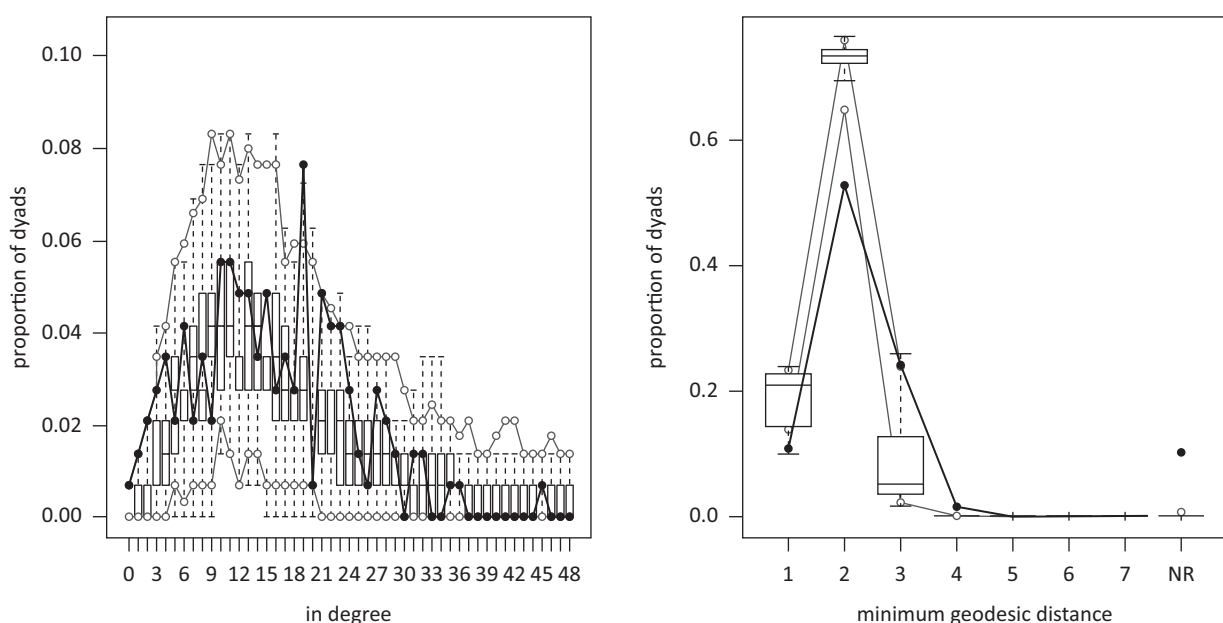
In Model 4, we added the MPs' sociodemographic characteristics (age and gender) to the previous ERG models. The estimates of the age are significant ( $p < 0.001$ ) and positive for the youngest MPs (26–44) of the Catalan network ( $EST = 0.515$ ;  $SE = 0.047$ ), and significant ( $p < 0.05$ ) and positive for the Dutch network ( $EST = 0.149$ ;  $SE = 0.060$ ). For the second age cohort (45–59), the estimates are negative in both networks, rejecting the idea of homophilic communication ties among the MPs of this cohort. However, while in the case of the Catalan MPs, the estimates ( $EST = -0.356$ ;  $SE = 0.055$ ) are significant ( $p < 0.01$ ), in the Dutch network, the estimates ( $EST = -0.219$ ;  $SE = 0.282$ ) are not significant. Indeed, the estimates of the oldest cohort of MPs ( $\geq 60$ ) reveal a similar tendency. In both networks, these estimates are negative, but in the Catalan network, the estimates ( $EST = -0.753$ ;  $SE = 0.304$ ) are significant ( $p < 0.001$ ), whereas in the Dutch network, the estimates ( $EST = -0.219$ ;  $SE = 0.282$ ) are not significant. Lastly, concerning the gender, the estimates of the Catalan par-

liamentarians' Twitter mentions network do not show any homophilic behavior among male ( $EST = -0.037$ ;  $SE = 0.048$ ) or female MPs ( $EST = -0.057$ ;  $SE = 0.066$ ); and for the Dutch MPs' network the estimates are negative ( $EST = -0.057$ ;  $SE = 0.066$ ) but not significant for the male MPs and positive ( $EST = 0.113$ ;  $SE = 0.050$ ) and significant ( $p < 0.05$ ) for the female MPs. These results reveal that in terms of the MPs' gender, the Dutch female parliamentarians are the only ones showing a homophilic mentioning behavior.

To sum up, H1 is partially corroborated because reciprocity only explains the formation of mentions' ties among the Catalan MPs. This is an unexpected finding since reciprocity was expected to explain the formation in both networks. As for the existence of status homophily, age explains the formation of mention ties among young (26–44) Catalan MPs and among young (26–44) Dutch MPs (H3). However, only in the Netherlands can the existence of gender homophilous ties be observed (H2). Furthermore, concerning MPs' political position (leadership position homophily), homophilous ties seem to be present only among Catalan parliamentarians not holding leadership positions (H4). Lastly, the existence of ideological homophily is corroborated in the case of Catalan parliamentarians exclusively (H5). This is also an important unexpected finding since ideological homophily was assumed to influence the formation of communication ties in both networks.

To assess how well the model captures the structure of the data, Figure 2 shows how the observed in-degree and minimum geodesic distance distributions replicate the network statistics observed in the original data.

The vertical axis in both figures represents the relative frequency. The solid lines represent the observed statistics in the actual network (thick black lines).



**Figure 2.** Goodness-of-fit diagnostics (Model 4: Dutch MPs Twitter mentions network).

The grey lines show the 95 percentile range of the simulated data. The model performs reasonably well for the in-degree and the geodesic distance distributions. The observed distributions generally fall within the quantile curves for most of the range. The model overestimates the average in-degree distribution and geodesic distance, but overall, the model represents the shape of the distributions.

6.2. Results of the E-I Index

The E-I index was calculated to assess the degree of polarization in the Catalan parliamentarians’ mentions network and the Dutch MPs’ mentions network. Table 3 below shows the results of the analyses.

The values of the rescaled E-I index (number of iterations: 5,000), which takes into account the group sizes of the parties, show that the Catalan MPs’ mention Twitter network (-0.082) is much more polarized than the Dutch network (0.238). These results corroborate the findings of the ERG models, which show a higher degree of homophilic communication ties among the Catalan parliamentarians’ mentions (see Table 2) than among the mentions of the Dutch MPs.

7. Discussion and Conclusion

This research reveals that the communication ties among Catalan MPs are much more homophilous than the communication ties among the Dutch parliamentarians. Concerning the existence of value-homophily, holding similar ideological views (left-right) explains the existence of mentions among the Catalan MPs to a large extent (see Figure 1), whereas ideological similarity does not explain the existence of mentions among Dutch parliamentarians. A possible explanation for such a divergent effect of ideological similarity can be drawn from the different political cultures of both parliamentary networks. While in Catalonia, a relatively young democratic party system, communications in Twitter with MPs holding opposite views are often disregarded by fellow politicians and political parties, in the Netherlands, a long-running democratic party system, with a strong tradition of mutual consultation (Lijphart, 1999), negotiation, and coordination among parties (Hendriks & Toonen, 2001), interactions among MPs who think differently seem to occur much more often.

As for the existence of status-homophily, in line with previous research in the field (Straus et al., 2013), our data reveal high levels of homophily among the mentions of young (26–44) Catalan MPs and young (26–44)

Dutch MPs. However, in contrast to previous studies which found that gender similarity explained interactions in Twitter political networks (Esteve-Del-Valle et al., 2021; Karlsen & Ejolras, 2016), homophilous gender ties were only found to explain interactions among female MPs in the Netherlands. The same applies to the *leadership position homophily* among the MPs (holding a political position), which despite being found to explain the existence of followee relations among politicians (Esteve-Del-Valle & Bravo, 2018b), does not explain the existence of homophilous ties among the Catalan MPs or among the Dutch MPs.

The results also show that homophilous ties at the dyad level (MP–MP) explain the degree of polarization in the Twitter mentions network at a network level. Thus, in Twitter mention networks with a high degree of homophilous communication ties among the nodes, the degree of political polarization in the networks is expected, *ceteris paribus*, to be higher than in networks with more heterogeneous communication ties.

Lastly, the study shows the relevance the political context has in affecting communications on Twitter. In a context where parliamentarians are pushed to choose between being in favor or against the independence of Catalonia, MPs’ use of Twitter could be entrenching their ideological views. On the other hand, in the Netherlands, a much less polarized political context, with a strong tradition of consensus-seeking, by facilitating interactions between parliamentarians who think differently, Twitter could help enhance the infrastructure of “consensus democracies,” in which effective government is possible despite the fragmentation of the party system.

The findings of this study are also significant to determine whether social media contribute to the expansion of the public sphere in online legislative networks. They suggest that communications on Twitter can enclose politicians in so-called “echo chambers” (Catalan network) or open up cross-ideological and cross-party interactions (Dutch network). These results align with those found by Karlsen et al. (2017) in their experimental study of online debates, which argues that “the Internet provides the opportunity to interact with like-minded people and those with opposing views at the same time” (Karlsen et al., 2017, p. 270), and they appear to back up Barberá et al.’s (2015) suspicion that previous studies in the field may have overestimated the degree of political polarization in social media.

This study has some limitations. On the one hand, MPs’ communications were only investigated in the Twitter mention network; thus, future research should expand this inquiry to the study of the other two

**Table 3.** Rescaled E-I index of the Catalan MPs’ Twitter mentions network and the Dutch MPs’ Twitter mentions network.

	Catalan MPs’ Network	Dutch MPs’ Network
Rescaled E-I index	-0.082	0.238

Note: The E-I index ranges from -1 (all ties are internal to the group) to +1 (all ties are external to the group).

Twitter communication layers (following–follower and retweet). On the other hand, the ERGMs could be complemented with more attributes, such as MPs' educational level, another potential status-homophily factor, or their position in the parliamentary chamber (e.g., parliamentary group leader) as a potential value-homophily factor. However, this research contributes to expanding the study of homophily and political polarization among political elites—key agents of online political polarization—and opens new avenues for future research in the field.

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### Conflict of Interests

The author declares no conflict of interests.

### Supplementary Material

Supplementary material for this article is available online: [https://osf.io/924mu/?view\\_only=fbbc11b5e9da4075b2ad5925ff344c21](https://osf.io/924mu/?view_only=fbbc11b5e9da4075b2ad5925ff344c21)

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Article

## The Use of Social Media by Spanish Feminist Organizations: Collectivity From Individualism

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### Abstract

In recent years, social media platforms have become a popular tool for feminist activists and the main medium of communication for new feminist organizations to gain higher visibility. However, along with opportunities, they also bring a reshaping of communication forms and challenges in the modes of organization of these groups, which seek to transform the prevailing individualist logic of the mediated social media landscape into a collective identity. Through the findings of qualitative, semi-structured interviews and the analysis of the content published online, this article looks at the structures of interactions and organizing processes in the social media accounts of new Spanish feminist groups. The findings show that although the committees are aware of the importance of an online presence, they face many obstacles in the creation of collective profiles due to the lack of guidelines, having no clear organized steps on how to post content with consensus within each committee, and the many demands of the speed-driven nature of social media platforms.

### Keywords

digital feminism; feminism; feminist media studies; feminist organizations; organizing processes; social media

### Issue

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### 1. Introduction

In recent years, social media platforms have played a leading role in the rise of the feminist movement and its presence in the public sphere at both national and international levels, being the main engine of the fourth wave of feminism (Zimmerman, 2017). These networks and their ecosystems have introduced new methods of communication and organization that have influenced how the movement has developed in recent years, allowing, among others, the transformation of individual into collective discourses, the inclusion of a multiplicity of voices and dialogues (Baer, 2016; Clark, 2014; Davis, 2019), and the democratization of the public sphere.

Social media platforms are also the core of the new feminist organizations, giving them a sense of connectedness with other feminists, facilitating the contribu-

tion towards a common identity, and establishing a networked, counter-public sphere for debates (Calhoun, 2011; Edwards et al., 2019; Williams, 2016). Despite its potential, the use and integration of social media is also a challenge for established feminist organizations due to their institutional constraints, which are more aligned with collective political action. While they rely on centralised coordination and a clear organizational structure, the logic of online connective action requires individuals to self-express willingly on social media (Bennett & Segerberg, 2013).

Spain has been one of the countries with the greatest increase in feminist mobilizations over the last five years, which has led to the launch of a considerable number of new women’s committees (Navarro & Coromina, 2020; Willem & Tortajada, 2021). These activist organizations were created to organize the first feminist

general strike in the country on March 8, 2018, to coincide with International Women's Day. This was also the second International Women's Strike under the slogan "if women stop, the world stops" in favour of gender equality and against sexual violence, which was followed in more than 170 countries, mainly in America and Europe, with a much higher international response than in the previous year. In Spain, over 30 regional and local organizations were created across the entire country to lead and spread the feminist messages and became the main organizers of this mobilization. These groups have maintained their activities since then and have also developed into permanent activist committees.

While the strike was organized offline by these committees, its success was possible because of the interplay between digital actions and offline groups. Thus, the activity on social media platforms helped to increase the scope of the mobilization, particularly in the week before the main event. The committees considered the establishment of their collective social media profiles as a necessity to start the conversation and spread their messages. Furthermore, the widespread online resonance successfully helped to set the agenda for the public debate on other platforms, such as conventional media, including general-interest television channels, radio networks, and print and digital newspapers.

Considering this context, this research article aims to understand the organizational processes of the new Spanish feminist committees when using collective social media accounts. The study focuses on the organizational structures established by these groups to post on and update social media, the profile of the volunteers in charge of this task, and the coordination and flows of communication when deciding the content published on the accounts. To do this, 12 semi-structured interviews have been undertaken with the women in charge of updating the official social media profiles of the different committees. In addition, the results obtained have been complemented with the analysis of the content published by the committees analyzed on Twitter, Facebook, and Instagram.

## 2. Social Media and Feminist Organizations

Social media platforms are the main engine of the fourth wave of feminism (Zimmerman, 2017). The functionalities and possibilities of social networks in terms of connections and creation of communities are undeniable, as well as the amplification and reinforcement of the scope of discourses of feminist activist organizations (Maloney, 2017; Tufekci, 2014). This means connecting different social groups and creating new forms of activism, visibility, and protest (Baer, 2016), thus helping to reflect on and revise its identity and self-understanding (Şener, 2021).

Nevertheless, the role played by these networks on improving and changing society is still largely unknown, provoking polarized opinions on the role of social net-

works as an activist tool. These debates bring to light that social networks are not the utopian horizontal dialogue public spaces that were imagined in the beginning (LeFebvre & Armstrong, 2018). In addition, this reality has also become the highest expression of individualism, linked to the networked individualism (Wellman, 2002), which witnessed the appearance of a new type of feminism, "pop feminism" (Banet-Weiser, 2018), also known as "feel-good feminism" or "mainstream feminism" (Phipps, 2020).

Pop feminism adopts an individualistic and performative notion of feminism based on the decontextualization and depoliticization of the movement, being available to the general public, "largely because it has lost all sense of intellectual rigour or political challenges" (Kiraly & Tyler, 2015, p. 10). The endorsement of celebrities and influencers has been crucial in the expansion of this phenomenon. The latter, in addition, are considered by Rottenberg (2014) as an example of the individualist feminist that has developed within the neoliberal consumer culture, driven by the belief that a certain type of equality has already been reached.

From this perspective, the hegemonic feminism of social networks is accused of being led by straight, white, and privileged women, and therefore there is greater visibility of the matters and issues that concern them. Also, it is argued that the very practices that characterize the influencers is the promotion of "do it yourself" and self-exploitation values (Banet-Weiser, 2018), linked to neoliberal culture, the cyber-fetishism (Morozov, 2009) context as well as the commodification of feminist ideas. This leads to commodity feminism (Banet-Weiser & Portwood-Stacer, 2017) or femvertising (Varghese & Kumar, 2020) since it involves using feminist messages and ideas with the aim of obtaining economic gain. Authors such as Maloney (2017) show that this phenomenon can give rise to an accidental feminism formed by people in social networks who, without engaging in feminist activism, are considered feminist references due to the type of messages and activity found on their profiles.

This point is linked to the term "performative activism" or "slacktivism" (Christensen, 2011; Rotman et al., 2011), which results from the union of "slacker," a vague or lazy person, and "activism." It can be defined as activity produced in social networks with low risk and low cost to the user whose purpose is to raise awareness and produce some type of change or satisfaction on a reduced scale compared to the person involved in the activity (Rotman et al., 2011). This can include small social media interactions such as liking or sharing a feminist post. Although these terms initially had a positive connotation, creating movements of change at a low level, the high levels of proliferation in recent years by influencers, microcelebrities and the general presence of opinion leaders and public figures on social networks has led to its use being associated with negative effects. These include the need to "go viral" to attract

interactions and relevance on the platform instead of social change.

With the rise of feminism on social media, offline feminist organizations have considered having a social media presence as a necessity (Fotopoulou, 2016) to become a part of the digital public sphere. However, the presence of these groups on social networks forces them to enter a complex and contradictory terrain, moving from a sense of collectivism to an individualistic perspective which challenges the way these women's groups work. With this in mind, the multiple Spanish committees created for the organization of the feminist strikes convened in recent years for International Women's Day presents a case of study to unravel the organizations' structures and the patterns of their digital presence. Thus, the main aim of this study is to analyse how these committees use social media to portray their collective identity. Accordingly, the following research questions are posited:

RQ1: To what extent have the committees established a working organizational plan to guide the updates of their social media profiles from a collective perspective?

RQ2: What is the profile of the women that are responsible for the social media accounts in terms of their knowledge and relationship to social media?

RQ3: What type of content is published on the accounts and how is it decided?

### 3. Material and Methods

In order to answer the objective and the research questions set, a series of semi-structured interviews with the women in charge of updating and posting on the offi-

cial social media accounts of the committees have been carried out. The semi-structured interviews have been developed around the following main topics: the dynamics carried out to keep the profile updated, the coordination flows within the committee, the professional profiles of the women in charge of the social media profiles, and their relationship with the social networks including their level of knowledge and expertise towards the platforms in their personal life and also their professional field. The committees were found by reviewing the information on the Spanish committee website ([www.hacialahuelgafeminista.com](http://www.hacialahuelgafeminista.com)) at the end of 2018 and its social media profiles. In total, 38 different committees were found and contacted through direct private messages on social media, or an email was sent through the authors' institutional university's email address if available from the profile.

From these initial contacts, 12 interviews (Table 1) were conducted with activists from 10 different commissions (26.3% of response rate). In two of the assemblies, they considered that it was not appropriate to only speak with one person since the networks were collective and two interviews were made with those in charge, evidencing the first result on their mode of organization. The scope of the commissions ranges from the autonomous community level, such as Aragón, Asturias, and Catalonia, to a local level such as Badajoz, Jaén, Leganés, or Valencia. The online semi-structured interviews took place throughout 2019 and lasted between one and one and a half hours.

The semi-structured interviews were based on four thematic sections: (a) the profile of the woman in charge of social media, including questions related to their socioeconomic information (age, profession, education, residency) and to their experience in offline and online activism; (b) the social media of their committee, where questions around the objective, the creation

**Table 1.** Sample description.

Committee	Scope	No. of			
		Interviewees	Facebook	Twitter	Instagram
Aragón	Regional	1	8MAragon	8MAragon	8maragon
Asturias	Regional	1	AsturiesFeminista8M	Asturies8M	Asturiesfeminista8m
Badajoz	Local	1	Plataforma8MBadajoz	8MBadajoz	8mBadajoz
Burgos	Local	1	Huelga8MBurgos	—	Huelga8mburgos
Catalunya	Regional	1	vagageminista8m	vagafeminista8M	Vagafeminista8m
Jaén	Regional	2	Feministas8MJaen	—	Feministas8mjaen
Leganés	Local	1	—	8MLeganes	—
Lleida	Local/Regional	1	grupdoneslleida	doneslleida	—
Segovia	Local	2	8MSegovia	8MSegovia	8msegovia
Valencia	Local	1	assembleafeministavalencia	AssembleaVlc	—
Madrid	Regional	—	FeminismosMad	feminismosMad	Feminismosmadrid
State	State	—	Huelgafeminista	Huelgafeminista	8mhuelgafeminista

process, and the organization expectations and reality were raised; (c) content published, where aspects of the type of content posted, the selection of the posts and topics, censorship topics, and established guidelines were discussed; and finally, (d) general opinion. Regarding the latter, three specific questions were asked in terms of (a) the consideration of social media as platforms to create a collective identity within the committee and with other women in their region; (b) their opinion on the relationship between their online presence and their offline success; and (c) their considerations of social media as key elements of the success in the rise of feminist activism in the last years.

In 2021, all women interviewed were contacted again and meetings with eight from the sample were conducted (Aragón, Asturias, Badajoz, Jaén [two interviews], Lleida, Segovia, and Valencia). The main objective was to acknowledge if there had been significant changes in the role of the social media profiles of the committee, the method of organization, and the type of content published, with conversations lasting around 30 minutes.

In addition, a quantitative content analysis has been conducted on the posts published on the social network profiles of the committees, including Facebook, Twitter, and Instagram, between March 1 and March 31, 2019, and 2021, excluding 2020 due to the beginning of the pandemic. It should be noted that all the publications of the interviewed commissions were considered, but the profiles of the state commission and that of Madrid were also added to the sample due to their relevance. In total, 4,073 posts have been coded and analysed with an inductive approach, exploring the sample to discover patterns, and interpreting their meanings and implications without having pre-existing categories, so as to have a specific understanding of the data (Gray, 2014; Tong & Zuo, 2018), being in line with previous studies with a feminist interpretative approach to content analysis (Fotopoulou, 2016; Leavy, 2007; López et al., 2018). In detail, the sample is divided into 2,213 tweets, 1,287 Facebook posts, and 573 Instagram posts.

The results have been placed into seven categories: knowledge dissemination, strike information, activities, media coverage, rallying cries, covid restrictions, and others. Each post was individually coded and classified by examining text captions, hyperlinks, and attached media.

It was decided to select March as a sample because despite all the committees being active during the entire year, they were initially created for the organization of the strike, coinciding with International Women's Day, on March 8. Thus, both the online and offline activity rises during this month, and it is a good sample to observe the diversity of posts and the content strategy of the accounts.

The data collection method has been conducted through different data mining processes according to the platform. Specifically, we have used the: (a) Twitter Full Archive Search API library for Python, provided by the Twitter platform for academic developers, to fetch all the

original tweets published in each selected Twitter profile; (b) the Facepager application based on the Facebook Graph API for the retrieval of Facebook posts; and (c) the Instaloader package for Python to gather Instagram feed data, not including stories due to their volatile nature. Each package fetches all the public posts published in the sample profiles on the basis of APIs. In order to ease the later analysis and treatment of data, all datasets, which were mainly retrieved in JSON data format, were converted to .csv files, containing information related to the textual, visual, and meta content of the posts and the available public metrics of each platform, including among others, the number of likes, comments, views, or media information.

#### 4. Results

All the committees analysed in this article, with the exception of the group "Dones Lleida," were created specifically to organize the first general strike for International Women's Day in Spain in 2018, launching their social media accounts before the first main event. This left only limited time to organize and debate how their online presence was going to be despite it being considered essential (Fotopoulou, 2016), with most of the organizations not initially discussing in-depth how were they going to act in the digital public sphere.

Since these organizations have continued and expanded their activities throughout the year, not solely for International Women's Day, their practices and organizational structures on social media have been evolving but still struggle to represent a collective non-hierarchical profile, being linked to the aim of non-hierarchical online social movements (LeFebvre & Armstrong, 2018).

##### 4.1. Organization Processes of Spanish 8M Committees

While all the Spanish committees were working independently, there was a willingness to create a common framework for the success of the general strike in the country. This led to discussions on certain aspects of their online presence in the Spanish general meeting that took place three months before the 2018 strike which brought together most of the Spanish local and regional organizations. In this meeting, a very broad protocol on how to publish on social networks was discussed, even though the information was not published or shared after the assembly.

In 2019, the state committee wrote more detailed guidelines, although still broad, on publishing content on social networks dealing with issues such as interaction with other users, social responsibility, or the relationship with media in order to unify their actions. "Very general guidelines were established that we had already followed the previous year and they did not bring changes in the way we were working" (Interviewee, Aragon's committee, December 3, 2019). In addition, more practical

aspects such as advice on how to write on each network and when to include images or make mentions were included. This information was greatly praised by the women in charge of social media on the regional and local committees, particularly volunteers above 45 years old, but was not considered relevant to younger women. An 18-year-old argues that “the advice on the different uses of each social network did not seem especially useful to us since they are platforms that we use on a daily basis and we already know how to adapt to each of them” (Interviewee, Segovia’s committee, March 20, 2019).

However, there was no shared discussion or sharing of best practices on how each committee should organize the work to maintain and update the collective profiles, which has been the most problematic issue of their online presence, especially during the first two years. “That first year, there was no time to discuss how we would organize to post content on social networks” (Interviewee, Badajoz’s committee, March 15, 2021). Therefore, while social networks had been considered a key element for the committees, establishing concrete guidelines and organizational structures for the committees were not a priority in the meetings.

In planning, large groups composed of eight to 10 women were created to oversee the social networks in the bigger committees whereas only three or four women were responsible in the smaller groups. This aimed to divide the work among several volunteers to maintain and update the accounts as well as to collectively decide the content posted through meetings or commenting on content before publishing it on social media accounts. “The objective was to talk about all these aspects [content, form, and frequency of publication] among all of us who were in the social network group, which were about 10” (Interviewee, Segovia’s committee, March 20, 2019).

Nevertheless, in reality, only two or three women were really constant in all committees when publishing content, sometimes with only a single person in charge of a social network, with no committee analysed being able to accomplish their initial objective. “I am posting the content I want to put but it should not be like this” (Interviewee, Asturias’ committee, March 23, 2019). These women claim that they were overwhelmed by the large number of activities that were organized, the success of attendance at them, and the strike participation for International Women’s Day. This highlights the importance of the offline essence of the 8M committees despite being created during the fourth wave of feminism, with social media at its core (Zimmerman, 2017).

These face-to-face activities are considered essential for the nurturing of a collective identity that includes all women, even those not using social media frequently or at all, which are often the older generations, as also found in feminist organizations in the UK (Fotopoulou, 2016). In addition, it helped committees to understand the real impact of their messages and activities: “We were getting engagement on Twitter, but we

didn’t know that our message had reached that amount of women until we celebrated our first offline action to prepare for the International Women’s Day strike” (Interviewee, Valencia’s committee, June 5, 2019). Thus, the curated online collective identity is considered relevant and necessary but not as tangible as the one cultivated offline, which evokes worries of slacktivism.

In the most recent years, there has been a refinement of the process and an effort to publish and portray an online collective identity since the women in charge of the social accounts have improved in sharing the workload among themselves and how to decide the content from a more collective approach, despite the limitations to fully working cooperatively on these platforms observed through the interviews. Personal messaging apps, mainly WhatsApp and Telegram, have become a central element of the collective accounts as platforms being used to discuss polemic content internally. The private networks of the committees are considered a safer space to debate the different views of social media strategies or issues and are used to give a unified message later through digital media:

In 2019 we created a Telegram group for only the women in charge of social networks and some of the communication section and this has helped us to share more decisions, although you have to always be aware of the messages without being able to disconnect too much. (Interviewee, Aragon’s committee, December 3, 2019)

Nevertheless, posting content on the accounts of feminist groups is still, for the moment, a fairly individual action due in large part to the frenetic pace of social networks. This is a consequence of their technical architecture, a business model based on immediacy, and a marked lack of time for discussion, attention, and content production (Fuchs, 2018). In order for messages to be visible and reach the largest number of users (O’Meara, 2019), the feminist organizations are forced to publish on a highly recurring basis, making it difficult to collectively agree on all posts, even with the use of personal messaging apps. As can be seen on the Asturias committee Facebook page, a daily average of eight posts are published. This is accentuated around International Women’s Day and the celebration of the general strike, where all the committees increase their activity considerably, both online and offline, even reaching 89 posts between March 7 and 9, 2019, on the Madrid committee Facebook account.

#### *4.2. Profiles of Women Activists Behind the Social Media Accounts*

As mentioned above, the task of publishing on the social media accounts of the organizations lies with a very small number of women, all highly engaged with political movements but with no professional experiences



related to communication or social media. “I started to politically mobilize when I was studying at the university and I haven’t stopped since” (28-year-old Interviewee, Huesca’s committee, March 23, 2019). “I have been a member of the labour union in my work for more than 15 years” (47-year-old Interviewee, Aragon’s committee, December 3, 2019). Understanding and describing the profiles of the women in charge of social media can help to comprehend the organizational structures of these committees.

There is much awareness that the accounts represent a community and that it is not necessary to publish their personal opinions, although frequently they are the ones who decide what to publish, how, and when. This represents an overflow of unpaid work that some women find difficult to maintain. Many committees realized from the remarks of the women in charge of social media that the rate of publication at which they started could not be maintained, especially since the work fell on very few women. The frequency of publication throughout the year was reduced leaving only the days around 8M with a high level of publications.

In general, there are two different types of volunteers in charge, separated according to their age, which leads to different ways of organizing. On the one hand, the youngest women are the ones in charge of the social networks because they are the most comfortable using these platforms and they volunteer because they think their knowledge could be useful to the group. This is particularly visible when referring to Instagram since it is a platform mostly used by the younger generations (Statista, 2021). For example, in the Segovia committee, which doesn’t have a large number of members, an 18-year-old activist volunteered to be in charge of this platform since she was the only one who knew how to use Instagram.

On the other hand, a different type of volunteer in charge of social media is women over 45 years of age who decide or have to be responsible for the accounts because they are the ones with the most availability. In some other cases, they are the ones willing to make the sacrifice because they have more established professional jobs.

The imbalances in the level of digital media literacy among these two groups, mainly due to age and social class, conditions the actual content published on social media. Instagram is the least used network by the committees, not all of the groups have created a profile, and the ones that have only post regularly if a younger woman or women are in charge. In addition, when working with other women to divide and share the workload, these two types of women in charge of social media are often organized in different ways. While the youngest share the updating of the profiles among the group, mainly through personal messaging apps as mentioned before, the older women are more used to publishing individually.

However, we can also find some similarities between both types of profiles. First, all of the interviewees share

an interest in social networks, not at the level of personal use, but their role and possibility for social change. However, they do not have any training in communications or social network practices, with jobs or studies unrelated to this area. This has compelled them to search for good practices of digital activism by looking at feminist profiles that they consider to be references on different topics. Simultaneously, they have improved their technical skills over the years to be more efficient, for example by learning how to program publications for a specific time. In the initial years, this was done manually, involving a lot of work for them. Therefore, practice and experience have helped these women use social media more efficiently to help their feminist activist group.

#### *4.3. Content Considerations on Social Networks*

The last important aspect of the organizational structure of 8M committees on social media is the type of content published. During the initial two years, 2018 and 2019, the only recurring common agreement reached across most committees was regarding the topics that should not be included on the collective social media profiles. Mostly, they referred to topics without a consensus within feminism such as prostitution or surrogacy. In addition, there was, and still is, an explicit will not to support any political party and to not disseminate actions carried out by any institutional body. Therefore, there is a sense of self-censorship common in online spaces described as safe due to its purpose of creating an environment in which women can express themselves without fear. According to the Roestone Collective (2014) and Gibson (2019), safe spaces are sites for negotiating differences and challenging oppression, becoming platforms for women to find strength and a sense of community that cannot be found in free speech areas, which in many cases are burdened with historical and cultural connotations, exhibiting the sexist and racist tendencies of the broader culture (Gibson, 2019).

Also, most groups aimed to only share news from more independent media aligned with feminism so as not to give voice to media that goes against the movement. “We are aware of how they report on issues such as gender violence or how they talk about feminism without taking intersectionality into account, and we do not want to reinforce its image or messages” (Interviewee, Aragon’s committee, December 3, 2019). These red lines have been redefined and further discussed as these committees have stabilized and reached consensus not only at the annual meeting of 8M but also during the rest of the year.

Looking into the content posted by the committees analysed on Facebook, Instagram, and Twitter, the results of the content analysis (Figure 1), are presented in a unified manner since the content posted has not changed significantly in the two years of the sample, 2019 and 2021. The only aspect to be highlighted is the health pandemic caused by the Covid-19 virus in 2021.

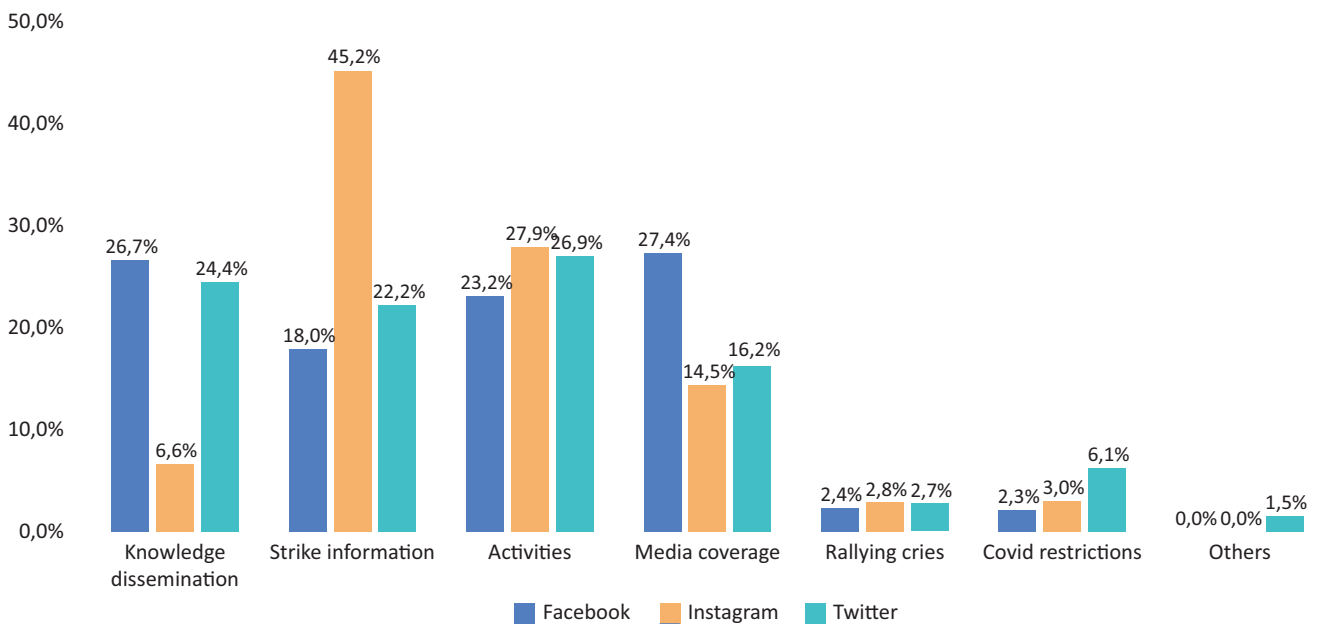


Figure 1. Topics of posts published on social media by 8M committees (March 2019 and March 2021).

While the peak of the pandemic had already passed by March 2021 in Spain, there were still public health concerns and limitations. Thus, some posts referred to the pandemic and the considerations to be taken while participating in the activities of the 8M of that year. For example, even in places like Madrid, the capital of Spain, the regional government forbid public gatherings and demonstrations during March 8, 2021, and the committees of those locations posted about the cancellation of activities.

The main reason why the profiles were created, as mentioned by most of the interviewees, is to inform and

disseminate offline actions and activities organized by these committees. They use social media to enlarge their offline collective actions. As can be seen in Figure 1, information on the committees’ activities is one of the main topics published on the accounts, with a similar percentage across the three networks analysed. A clear example of this is the tweet posted by the Asturias8M profile: “Tomorrow at 6 p.m. talk about gender inequality and violence against women, given by Ángeles Martínez” (Asturies Feminista 8M, 2019) or the Instagram post by the state account commenting on the activities of a regional committee (Figure 2).

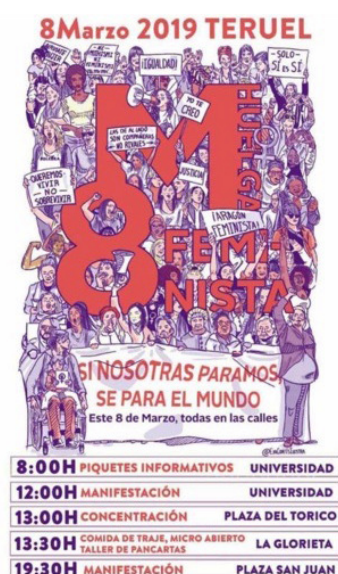


Figure 2. Example of an Instagram post disseminating offline actions. Notes: text in English—“The poster with all the activities organized since the 8M assembly in Teruel. This March 8 we fill the streets again. We are back to stop the world. Share and spread!” Source: 8mhuelgafeminista (2019).

Another important topic found in the accounts is knowledge dissemination to fill in the information gaps in society on the role or situation of women, past, present, or future. For example, some commissions create campaigns on social networks using hashtags such as “#Somohistóricasnohistéricas” (#Wearehistoricalnothistorical) used by the Segovia’s committee. These hashtags focus on specific topics such as claiming relevant women in science or important women from the territory in which the commissions operate, with the situation of rural women being a prominent issue in the commissions of the most closely linked territories to the primary sector. As can be seen in Figure 1, around 25% of the publications on Facebook and Twitter had this objective, dealing with issues such as violence against women, ecofeminism, gender discrimination in the workplace, or the situation of transsexual women.

The posts highlighting the schedule, useful information, and general considerations about the demonstrations and events of the feminist strike are found on all social network posts but especially on Instagram, with 45% of the content published acting as a noticeboard. However, according to the women in charge of the profiles, the presence of pertinent and quality images for the events is important in deciding if the content is posted on this network.

Linked to this topic, the publications relating to media coverage also stand out, at an average of 19% of the publications. This total is of all the posts related to the online broadcast of the 8M mobilizations, whether through images, text, or video, and also includes all content related to the day published by other media, mainly the digital formats of newspapers and radio stations, and is shared on the profile of the committees. An example of this kind of post is the tweet “Do not miss this article ‘8M, the refuge for all women’ by @MariahPerezS after another unforgettable #8M despite all the difficulties #8M2021” (Huelga Feminista, 2021).

On the other hand, we find fewer posts described as rallying cries, with an average of 2.6% of the content published on the social network profiles. These refer to all those publications that are based on slogans and rallying cries to encourage offline actions (Figure 3), such as “we are unstoppable!,” “if we stop, the world stops!,” or “fists up comrade!”

The women in charge of the social networks are aware of the differences between each platform, filtering the content published on each of them. This knowledge has been acquired with the use of social media since none of them has professional experience or studies related to social media or digital communications.

The structure of Twitter’s information and the ease of sharing links and videos make it the platform where topics are discussed in greater depth and variety of sources. This has been the most used by activism to generate online actions such as #metoo or #niunamenos. For example, in 2019, the Lleida assembly posted a series

of videos where different women spoke of their reasons for going on strike, using a trans woman as one of the examples.



**Figure 3.** Example of a Facebook post with a rallying cry. Notes: text in English—“For those who are here, for those who are not here, for those who are in danger, every day is March 8. Tomorrow #Thefightcontinues”. Source: Asturies Feminista 8M (2020).

Instagram is for posts when the commissions have an original photograph taken by a woman from the group or for infographics. For example, one of the actions of the state committee has been to create unified posters and design guidelines, such as colours and fonts, to be used by the other committees. Some committees also decided from the first year to create their own posters and images, especially when there is a woman on the committee who works professionally in the field of graphic design. However, as mentioned previously, the use of Instagram by each group is conditioned by the presence of young women who publish on this platform. In contrast, Facebook is used to reach an older audience and to post content to disseminate knowledge, due to its multimedia approach that allows users to easily post links, images, and videos.

The committees are also aware of the importance of hashtags and try to be aware of those used by the other committees. Hashtags play a crucial role in what Bennett and Segerberg (2013) define as “connective action” to describe how the conversation is organized and interpreted. Within the Spanish 8M committees, hashtags have also been used to raise awareness of the necessity and the reasons for the strike. For example,

the hashtags #Razonespor (#reasonsto) or #1000motivos (#1000reasons) draw attention to the individual reasons to join or support the strike, creating a collective action. Some large commissions, such as Catalonia or Valencia, being multi-lingual territories, have created specific hashtags since they also try to generate and disseminate messages in their own language.

## 5. Discussion and Conclusions

Activism today cannot be understood without the activity and role of social media (Cammaerts, 2015; Tufekci, 2014). However, the dynamics and structures of these networks condition how activist groups organize their online presence with some challenges that contradict the essence of grassroots activism, which follows the logics of centre-organized collective actions (Bennett & Segerberg, 2013). This study has focused on how new Spanish feminist committees are managing their collective profiles as a suitable example of the challenges when adapting the individualistic nature of social media (Wellman, 2002) to a collective action.

The success of the large feminist mobilizations and offline demonstrations in Spain in recent years is mainly due to a large number of messages and interactions on social media. These networks were used by people to self-express their opinions on the general goal of the action and gender equality through their individual identity, mostly with no affiliation to any political or activist organization. Despite the rise of slacktivism present on social media, with people merely posting content of a mobilization or cause to create their personal image (Christensen, 2011; Rotman et al., 2011), these connective actions have been able to set an agenda in the country, particularly around International Women's Day.

However, some women found the need to engage in the political movement through the creation of formal organizations, which were key in the success of feminist mobilizations mainly due to their online calls to action to participate in offline activities. All these committees consider social media profiles essential in order to be part of the public digital sphere. This duality creates several organizational difficulties for the activist committees due to the different logics of offline collective actions which are highly centralized compared to online dynamics, based on self-expression and decentralization (Bennett & Segerberg, 2013; van Dijck & Poell, 2013). The lack of correlation mechanisms between these two spheres generates a problematic hybridization for feminist organizations, sometimes even lacking continuity between offline and online messages.

Despite the importance given to social media, approving and discussing the protocols, guidelines, and organizational process to publish on the accounts of these committees has been relegated to the background, creating confusion for the women in charge of updating the profiles. This has not been made a priority within the face-to-face meetings with no clear organized steps

or consensus on how to post content within each committee. It has also created difficulties in working collaboratively, usually with the responsibility for the type of content, topics, and formats falling on a small number of volunteers, even just one on some occasions. However, a broader consensus is requested for the most problematic subjects. The most collective digital platforms used are WhatsApp and Telegram but they remain internal to each commission.

The main obstacle for a collective profile is the rapid pace of social media, since accounts need to publish frequently and to react quickly, so messages have greater visibility and impact, sometimes making it impossible to discuss them with anyone else. Among the three most dominant social networks, Twitter is the most used platform and the one with the highest pace, especially on the day of the strike due to its immediacy and its ability to share information from a greater diversity of sources.

Two types of women of different ages are in charge of social media; the younger ones have higher digital media literacy which leads to publishing in a broader format, such as stories on Instagram, and a higher level of coordination among them since their flow of communication is faster. The older ones publish more frequently, and they volunteer because social media is necessary, even if they do not have strong technological and social media knowledge.

Looking into the type of content published on the social network profiles, we witness that despite the lack of common agreements regarding the topics published on social media, there are some common practices and strategies, presenting a unified discourse on the different platforms. The dissemination of offline actions, followed by International Women's Day strike information, knowledge dissemination, and related media coverage are the main axis of their social media activity, becoming a safe space for women to communicate.

To conclude, the speed-driven nature and preference-driven algorithmic architecture of social media platforms, which require constant and varied activity, presence, and interaction (O'Meara, 2019), have direct consequences on the lifespan and visibility of the posts. Social media content has become more ephemeral, commercialized, and tabloid (Şener, 2021), becoming a challenge and an obstacle for feminist organizations. Thus, social networks have become a double-edged sword, being a complex terrain where it is difficult for feminist organizations to operate on digital platforms while maintaining their desired sense of united identity.

The study method has several limitations, in which the sample selection itself and temporal delimitation are the main ones. The sample, despite being timely, includes a significant period during the pandemic, which had its own organizational restrictions and led to new communication methods differing from standard years. With this in mind, current findings could be complemented with future studies built upon the model proposed. This could include the comparison with



organisational processes within committees from other countries or regions and how their presence on social media meshes with the nurturing of collective actions and their power of mobilizations over time.

### Conflict of Interests

The authors declare no conflict of interests.

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