Examining the Connectedness of Connective Action:
The Participant-Initiated Facebook Pages in
Hong Kong's Umbrella Movement

YIN ZHANG
Hong Kong Baptist University, Hong Kong

FRANCIS L. F. LEE
The Chinese University of Hong Kong, Hong Kong

Contemporary large-scale protest campaigns are often marked by the presence of a wide array of individual- and small-group-based actions initiated by the participants themselves. However, scholars have rarely examined whether and how the participant-initiated actions are connected with each other, whether and how they are connected to the movement leaders, and whether the interconnections among the participant-initiated actions relate to existing divisions within a protest. This study examines 138 participant-initiated Facebook pages established during the Umbrella Movement in Hong Kong in 2014. The analysis shows limited connections among the pages on social media, and limited connections between these pages and the leading groups. Nonetheless, pages sharing the same thematic concern were more likely to be connected with each other through page liking and content sharing. Pages sharing the same ideological predilections were more likely to be connected through page liking, yet less likely to be connected through content sharing. Implications of the findings are discussed.

Keywords: social movement, connective action, homophily, Facebook, social network analysis, Umbrella Movement

For many years, social movement scholars have argued that the Internet might lead to the emergence of new types of social movements (Earl & Kimport, 2011). A series of prominent protests around the world since 2010, ranging from the Arab Spring and Occupy Wall Street to the Umbrella Movement in Hong Kong in 2014, have apparently confirmed the emergence of new forms of protest campaigns. Theoretically, Castells' (2012) conceptualization of networked social movement and Bennett and Segerberg's (2013) explication of the logic of connective action have provided the hitherto most influential accounts of such protests.

Yin Zhang: zhangyin@hkbu.edu.hk
Francis L. F. Lee: francis_lee@cuhk.edu.hk
Date submitted: 2017–07–25

In addition to the occupation of urban space, two other core characteristics of these protests are the heavy usage of digital media for communication and coordination and the presence of participant-initiated actions within the broader collective action campaign. Both Castells (2012) and Bennett and Segerberg (2013) argued that the more decentralized formation of such protests is conducive to mobilization because it allows people to join the campaign in their own ways. However, there are also concerns with whether decentralization would weaken internal cohesion and the ability of movement leaders to direct the movement in response to ongoing political dynamics.

To what extent the advantages and disadvantages of decentralization would materialize in a protest campaign can depend on whether and how the individual or small-group–based actions are connected to each other and to the movement leaders. Are they closely interconnected so that information can flow more effectively? To the extent that interconnections exist, what are the principles or logics behind the connections? Do they tend to splinter into clusters with different or even competing ideologies?

This study tackles these questions in the case of the Umbrella Movement in Hong Kong. It analyzed a set of 138 Facebook pages created by ordinary participants during the movement. They constitute a distinctive set of individual- or small-group-based actions during the occupation campaign. Examining the interconnectedness of these participant-initiated actions and the principles underlying the interconnections shall enhance our understanding of the dynamics, power, and limitations of new forms of protests.

The Question of Decentralization in Connective Action

Conventionally, the conducting of protests relies on formal social movement organizations for effective resource mobilization (McCarthy & Zald, 1977) and the development of collective action frames (Gamson & Modigliani, 1987). However, formal organizations are losing their grip on people in late modern societies (Bauman, 2000; Castells, 2000). Increasingly, protests can be initiated and executed by self-coordinating citizens through the use of digital media (Lee, 2015a).

Against this background, Bennett and Segerberg (2013) put forward the "logic of connective action" as a theoretical account of how large-scale protests can emerge without social movement organizations playing a central role. They argued that contemporary protests arise from citizens' urge to express themselves. When triggered by a spark of indignation, and with the aid of the viral dissemination of mobilizing messages, mobilization can scale up quickly. In a "crowd-enabled connective action," the participants are often not tied to formal social and political groups, but they are likely to be avid users of digital and social media (Anduiza, Cristancho, & Sabucedo, 2014).

Participation in connective action does not require agreement with an elaborate framing of the issue and the adoption of a fixed identity. Rather, mobilization can be achieved through the dissemination of personal action frames, which are easily personalized ideas expressed through a simple statement or slogan that links potential participants with the protest. Bennett and Segerberg (2013) emphasized the symbolic inclusiveness of the personal action frames, but they also noted that a connective action campaign can involve a dazzling array of such frames. It is possible that, within a large-scale protest

campaign, the production and dissemination of different memes and themes can appeal to distinctive groups of participants.

The new dynamics and the digital transmission of simple yet powerful ideas can lead to a more decentralized and networked movement formation than in the past (Castells, 2012; Juris, 2004, 2008). The term *connective action* can therefore be understood as a specific type or formation of protest action resulting from a distinctive process of mobilization. Participants in a connective action campaign can initiate and engage in a wide range of activities, many of which are personalized or conducted by small groups. In other words, people can construct their individualized mode of participation (Lee & Chan, 2016; Milkman Luce, & Lewis, 2013).

Because of its decentralized formation, connective action or a networked social movement is often understood as leaderless. Empirically, whether such movements are indeed leaderless can be disputed (Nepstad & Bob, 2006; Poell, Abdulla, Rieder, Woltering, & Zack, 2016). Moreover, many protest campaigns have concrete policy goals and hence need to engage in negotiation with their targets. This necessitates some kind of leadership or representation. The problem, as Bennett and Segerberg (2013) acknowledged, is that "logics" can collide. The decentralized character of connective action may introduce tensions between the leaders and the mass of participants. Movement leaders may find it difficult to gain the trust or even the attention of the participants.

In addition, the decentralized formation of a connective action may lead the movement to splinter into subgroups or clusters. When a large crowd breaks into smaller groups of individuals with similar interests, the splintering may become problematic if it is mapped onto existing lines of internal conflict. Internal conflicts are common to many social movements. Such conflicts can take the form of factionalism within movement organizations (Balser, 1997), competition between groups and organizations within a movement (Hathaway & Meyer, 1993; Tarrow, 1990), and disagreement on movement strategies and framing (Benford, 1993). If the decentralized connective action evolves into a formation in which the clustering of actors corresponds to existing lines of division, the internal conflicts could be aggravated. This could, in turn, heighten the difficulty to sustain the movement and to achieve an outcome. Therefore, how the individualized activities constituting a connective action are related to each other should be an important concern.

The Logic of Social Media Connections

Against the above theoretical background, this study focuses on the interconnections among the participant-initiated actions and between these actions and the movement leaders on social media. Specifically, this study focuses on Facebook because of its prominence in Hong Kong (Go-Globe, 2015) and in the Umbrella Movement (Lee & Chan, 2016). Setting up and operating a Facebook page is treated as an action that both the movement leaders and the individual participants can initiate and engage in. Therefore, the empirical focus in this study is how the Facebook pages are interconnected. The focus on one social media platform also means that the affordances and constraints faced by its users are parameters instead of variables in this study. The influences of affordances and social media algorithms

(e.g., Su, Lee, & Lin, 2017; Treem & Leonardi, 2012; Zhang & Wang, 2010) are therefore not a central concern of this article.

Tackling the research problem requires us to identify the possible forces and principles shaping Facebook connectedness. However, although the role of Facebook in large-scale protests has received much scholarly attention (e.g., Clark, 2016; Hensby, 2017; Vasi & Suh, 2016), the interconnectedness among Facebook pages belonging to the same movement has rarely been examined. Besides, Bennett and Segerberg's (2013) theorization focuses on explaining the mechanisms leading to the emergence of connective action campaigns. Their theory does not provide arguments that can guide expectations of whether and how the participant-initiated actions are interconnected and are connected to the movement leaders.

We therefore adopt an exploratory approach when analyzing the relationship between the participant-initiated pages and the pages of the movement leaders. We focus on three possible patterns that are conceptually meaningful. The first is simply that the participant-initiated pages are not connected to the movement leaders on social media at all. This would indicate a general disconnection between the participant-initiated actions and the actions of the movement leaders, at least in the social media arena. The second is that a substantial proportion, if not all, of the participant-initiated pages are connected to the leaders on social media more or less equally and directly. This would indicate that the movement leaders remain at the center of an online network, with the participant-initiated pages directly connected to them.

The third possibility is that only a limited number of the participant-initiated pages are connected to the movement leaders' pages online, and these pages are in turn connected to relatively larger numbers of other pages. In this case, movement leaders may still be well connected with the participant-initiated actions, but mostly indirectly through certain main connecting points. If this pattern emerges, it implies that the movement leaders remain at the center of an online network, though its influence on other groups is channeled through intermediaries.

Meanwhile, for analyzing the interconnections of the participant-initiated pages, this study focuses on the notion of homophily, that is, the tendency for individuals to bond with similar others (McPherson, Smith-Lovin, & Cook, 2001; Wilhelm, 2000). Homophily arises because similarities in interests and views can facilitate communication, build trust, minimize conflicts, and ensure that one's worldview remains unchallenged (Coates, 2003; Mutz, 2006; van de Bunt, Wittek, & de Klepper, 2005). In the digital media arena, research about friendship on social networking sites has found varying degrees of homophily based on ethnicity, religion, age, country of residence, marital status, sexual orientation, and reasons for adopting social networking sites (e.g., Hargittai, 2007; Thelwall, 2008). In political communication research, notions such as cyberbalkanization (Sunstein, 2009, 2017) and online echo chambers (Iyengar & Hahn, 2009) are also premised on people's tendency to selectively expose themselves to like-minded political views and to connect to like-minded others.

More pertinent to this study, in a large-scale movement, participants need to seek up-to-date information and obtain resources by connecting themselves with others. We expect homophily to apply to

the establishment of such interconnections. We expect three factors to be the bases of homophilous connections. First, a large-scale protest may involve participants who hold different views of the rationale, goals, and thus proper strategies of the protest. We use the term *ideology* to refer to a more or less coherent set of views about a movement (and use *ideology* rather than the notion of *frame* because such views may not be systematically articulated and expressed). When ideological divisions exist in a movement, participants sharing the same ideology are more likely to be connected with each other because of people's tendency to protect their worldviews (Iyengar & Hahn, 2009; Sunstein, 2017).

Second, a large-scale social movement may have various dimensions and may encompass a range of subissues. Many participants may be interested primarily in only some of the dimensions or subissues. Hence, the participant-initiated actions may have different thematic concerns, which are observable from their Facebook page contents. Those sharing the same thematic concern are more likely to be connected because they are more likely to find the contents of each other's pages useful or interesting.

Third, in a large-scale occupation protest, digital media activities can be related to physical activities in the occupied areas. When the occupation covers a widespread geographical area, location may also become a relevant factor: Participants and groups sharing the same physical location are not only more proximate physically, but their online activities may also be more likely to be connected with each other.

Background, Research Questions, and Hypotheses

The Umbrella Movement was a 79-day civil disobedience campaign in Hong Kong happening between September 28 and December 15, 2014. It demanded the institutionalization of a filterless election for the chief executive of the Hong Kong Special Administrative Region government. The idea of occupying the main streets in the financial district of Central was originally proposed by a law professor in early 2013. He later formed Occupy Central for Love and Peace (OCLP), which became the main "planner" of the campaign (Lee, 2015b). The occupation was originally conceived to be a "highly disciplined" collective action and not expected to last for more than a few days (Lee & Chan, 2018).

However, when student groups started a series of protests in late September 2014, the dynamics of the movement changed. A series of contingent events, including police arrests of student leaders, the earlier-than-planned initiation of the occupation, and the police firing of tear gas into the protesting crowd, led to the scaling up of the action and the spread of the occupation to other places (Cheng & Chan, 2017; Tang, 2015). The occupations were later consolidated in three districts. OCLP, Scholarism (an association formed by high school students), and the Hong Kong Federation of Students (HKFS; the federation of university student unions) were generally regarded as the leaders, but many participants also developed a strong sense of autonomy and did not see themselves as followers of the leading groups.

When the movement settled into a prolonged occupation, the occupiers engaged in a wide range of individual and small-group activities. They practiced public arts, built temporary churches, set up mobile classrooms, and so on. Participants also self-coordinated to confront the counterprotesters and the

police. In cyberspace, participants and supporters were highly active in various activities (Lee & Chan, 2016). Most pertinent to this study, some supporters set up Facebook pages for various purposes, for example, to dispel movement-related rumors, to provide live updates about happenings in the occupied areas, and to encourage people to share their experiences related to the movement. These participant-initiated Facebook pages are thus the objects of our analysis.

It should be noted that these pages are the objects of analysis simply because they represent a distinctive type of participant-initiated action, and such actions are a core characteristic of a connective action campaign. In reality, the pages might belong to various other networks, but this study's focus is on whether and how these pages were connected to the movement leaders and to each other.

Another notable aspect of the Umbrella Movement is the presence of internal division. Without going into the details of local politics, suffice it to note that there was a moderate-versus-radical distinction within the movement. The moderates insisted on nonviolence and were more willing to consider strategic compromise. The radicals urged for escalation of action, abandonment of the principle of nonviolence, and rejection of compromise. Interestingly, one indicator of the moderate–radical divide was the movement's labels. The moderates used mainly Occupy Central or Umbrella Movement to name the campaign, whereas the radicals used Umbrella Revolution or the Cantonese term Ze-Taa Revolution. These labels signify the factions' views about the goal and purpose of the protest and their self-identities. Movement labels can therefore be an indicator of the group's ideology. Besides, whereas the movement leaders and the moderates stayed largely in the district of Admiralty, relatively more radicals were stationed in the occupation in the Mong Kok district (Lee & Chan, 2018).

Based on the contextual background and the conceptual discussions in the previous sections, we set up two research question and five pairs of hypotheses. Because the fundamental concern of this study is the problem of decentralization in a connective action campaign, the first question asks whether the participant-initiated pages were connected with each other and with the pages of the movement leaders.

RQ1:   To what extent were the participant-initiated pages connected with each other and with the pages of the movement leaders?

Connections on Facebook can be manifested through the acts of liking, sharing, and commenting (Khan, 2017). Liking reflects the recognition of a Facebook page by the liker; it could also indicate an intention of surveillance of the liked page because liking would enable one to receive updates from the page. Nevertheless, liking a page does not involve constant interaction. It is possible for a page to like another page and then have virtually no interaction with it. Sharing, in contrast, is tied to specific contents. Sharing a post signifies a judgment that the content is worth looking at. It could be driven by perceived informational utility, novelty, or resonance of the post, but it could also be an invitation to criticize the content. Sharing can be more or less regular. Degree of sharing activities between two pages thus indicates the extent of interaction between the pages. Meanwhile, commenting is a direct attempt to communicate with a page. But our preliminary observations suggested that it was extremely rare for a Facebook page to leave comments on other pages. Commenting was done almost entirely by individual users. Hence, our analyses—for RQ1 and for the following research question and hypotheses—just focus

on liking and sharing. Because liking and sharing are conceptually and empirically distinctive, our analysis will examine them separately.

We put forward RQ1 because whether and to what extent the participant-initiated pages form a network is an open question. However, as long as there are interconnections among the pages, some pages will be more connected than others. An interesting question, then, is what factors may relate to the pages' degree of connectedness. This is another exploratory question to be tackled before hypotheses testing.

RQ2:   What factors predict the degree of connectedness of the Facebook pages?

The analysis then turns to further examining the linkage between the participant-initiated pages and the movement leaders' pages. As discussed earlier, one possible pattern of connections between the two is that a few participant-initiated pages may serve as the nodes linking the movement leaders' pages to the other participant-initiated pages. If this pattern emerges, what one can see is a positive relationship between linkage with movement leaders and connectedness with other pages. We therefore propose the following pair of hypotheses:

H1:   There is a positive relationship between degree of connectedness of the Facebook pages and (a) liking the movement leaders' pages and (b) sharing the contents of the movement leaders' pages.

After examining the linkage between the participant-initiated pages and the movement leaders' pages, the other hypotheses are concerned with the factors explaining the connections among the participant-initiated pages themselves. As discussed, we expect the sociological principle of homophily to apply, and similarities in ideology, thematic concern, and geographical location are likely to matter. As pointed out earlier, one indicator of the ideology of a participant in the Umbrella Movement is how they labeled the occupation. Admittedly, movement label is a rough indicator of ideology, but it is readily accessible and analyzable and should be useful for the present purpose. The next pair of hypotheses is:

H2:   Facebook pages appropriating the same movement label in their names are more likely to have (a) liked each other and (b) shared each other's contents.

Another surrogate indicator of ideological orientation is how the page connects to the pages of major movement organizations, political parties, and mainstream and alternative media outlets. The movement groups, parties, and media themselves held varying views on the movement. If the principle of homophily applies, Facebook pages with similar ideological orientation should be connected with the same set of movement groups, parties, and media.

H3:   Facebook pages are more likely to have (a) liked each other and (b) shared each other's contents if they have also commonly liked several other Facebook pages.

Besides ideology, pages with the same thematic concern (i.e., purposes or interests of the actions) are expected to be linked to each other. That is, the Umbrella Movement had many dimensions

and subissues (e.g., the practice of public art, specific social issues articulated with the occupation). Pages sharing an interest in the same dimension or subissue were more likely to be connected.

H4:   *Facebook pages that share a common thematic concern are more likely to have (a) liked each other and (b) shared each other's contents.*

Finally, because the Umbrella Movement dispersed into three occupied areas, we expect that pages tied to the same occupied area were more likely to have ties with each other. This is because geographical proximity may increase the possibility of offline interactions, which could lead to online interactions. The last pair of hypothesis is:

H5:   *Facebook pages tied to the same geographical location are more likely to have (a) liked each other and (b) shared each other's contents.*

Method and Data

The following analysis focuses on Facebook pages created as part of the Umbrella Movement and established within the 79 days of the occupation. The pages derived do not include those of the political parties, movement organizations, civic associations, and media outlets. This is because of this study's concern with participant-initiated actions within a connective action campaign. Nonetheless, how the derived pages were connected to the pages of political parties, movement groups, and media outlets forms part of the analysis.

We adopted a manual approach to identify the pages, partly because of the judgment that the total number of relevant pages should not be too large and partly because we intended to take into account the profile pictures and cover photos when judging whether a Facebook page was created as part of the Umbrella Movement. A manual search might be more reliable than typical data-crawling techniques when both visuals and texts have to be considered.

In late 2015, an assistant searched for relevant Facebook pages by starting with several prominent pages, including those of the three movement leaders: OCLP, Scholarism, and HKFS. Relevant pages were identified through the pages liked by these starting pages. In other words, relevant pages were identified by moving along the networks created by page likes. Operationally, a page was considered to belong to the movement if:

- It had published or shared contents related to the Umbrella Movement, though it is not necessary for the page to focus exclusively on the movement, and

- It fulfilled one of the following two self-identification criteria:

    - Its name includes one of several terms people used to refer to the movement, including *zim-ling* (occupy), *zim-zung* (occupy Central), *jyu-saan* or simply *saan* (umbrella), and *ze-daa* (literally, using the umbrella to fight), or

▪ Its cover photo or profile picture uses either the core symbols of the Umbrella Movement (e.g., a yellow umbrella, a yellow ribbon, or the "I Want Genuine Popular Election" banner) or a picture of the occupied site.

A total of 178 participant-initiated Facebook pages were identified through the procedure. Excluding pages created before September 28, 2014, and after December 15, 2014, the number of pages went down to 138. They are the objects of analysis.

Several attributes of the Facebook pages were recorded. We registered the number of likes the pages got, the timing of the first news feed (September 28 = 1 and December 15 = 79, which indicates the time of establishment of the page), the timing of the most recent news feed, and total number of posts published between September 28 and December 15. We coded each post for whether it included photos, videos, and graphics. The percentages of posts including photos, videos, and graphics (as three separate variables) were calculated. We also noted all the other Facebook pages liked by a page, which is the basis for constructing additional variables and matrices, such as whether a page has liked the three main movement leaders' pages and the matrix about the number of pages commonly liked by a pair of pages.

For thematic concern, a research assistant coded each page into one of five categories: (a) art and creative works, which focused on sharing artwork related to the Umbrella Movement; (b) information updates, which focused on providing updates of the happenings in the occupied areas; (c) sharing of participation experiences, which happened on pages encouraging people to share their experiences related to the movement; (d) offerings of support from outside Hong Kong, which happened on pages created for people outside Hong Kong to express support for the Umbrella Movement; and (e) community issues, which focused on issues pertinent to local communities in Hong Kong. A thematic concern can be signified by the page name or by having the majority of the posts relevant to the theme.

In addition, each page was coded by whether it was connected to activities in a specific occupied area. That is, each page was coded as tied to Admiralty, tied to Mong Kok, tied to Causeway Bay, or not clearly tied to a site. The connection can be signified by the name of a page, its profile picture being taken in an identifiable occupied site, repeated checked-in locations, or repeated references to activities conducted in an occupied area in its posts.

The correct coding of many of the items required background knowledge about Hong Kong society and the Umbrella Movement. Instead of calculating intercoder reliability, we attempted to enhance the accuracy of the coding by double-checking the research assistants' page-level coding by.

Social network analysis (SNA) was conducted to examine the connections among the pages. Relational matrices of the 138 pages' mutual liking and sharing were created and analyzed using the program UCINET 6 for Windows. For each page, we derived the in-degree score and the out-degree score, which refer to the extent to which a page is linked by others and the extent to which a page is linking to others, respectively. In SNA, in-degree is typically a measure of a node's importance and reflects the

degree to which an actor is a focal point of communication in the network (Hanneman & Riddle, 2005; McCulloh, Armstrong, & Johnson, 2013). Out-degree measures of the degree to which a node has attempted to reach out to others and to acquire resources.

Besides the matrices of mutual liking and sharing, 12 additional matrices were created based on the information derived from the page coding: (a) common movement label in page title, (b) common thematic concern, (c) number of commonly liked pages, (d) common physical location, (e) difference between pages in the setup time, (f) difference in number of likes, (g) difference in number of outgoing likes, (h) difference in number of posts, (i) difference in number of shares per post, (j) difference in percentage of posts with graphics, (k) difference in percentage of posts with photos, and (l) difference in percentage of posts with videos. Analyzing the relationships among the matrices would allow us to discern the factors that can predict whether a relationship of liking or sharing existed between two pages.

Analysis and Results

Descriptive Statistics of the Facebook Pages

Table 1 summarizes the key attributes of the 138 Facebook pages in the sample, which helps answer RQ1. In terms of network attributes, the pages have an average liking-based in-degree score of 2.12 and an average sharing-based in-degree score of 3.47. This means that a Facebook page in the sample was liked on average by slightly more than two other pages in the sample, and its content was shared on average 3.47 times by other pages in the period between September 28 and December 28, 2014. Given that the pages have published on average 142.76 posts in the period of the movement, the small in-degree scores suggest that there was not much interaction among the 138 pages. The pages that constitute a core part of the connective action in the movement were actually largely unconnected in cyberspace.

The average out-degree scores based on liking and sharing are similar to the respective in-degree scores. The standard deviations indicate large variations among the pages. Only five pages in the sample had a liking-based in-degree score larger than 6, and nine pages had a sharing-based in-degree score larger than 10. Degree of connectedness varied substantially.

The prominence of the Facebook pages also varied substantially. The more prominent pages include *926: Ordinary Citizens at the Government Headquarters* and *LIVE: Verified Updates*. Both pages were liked by more than 100,000 people at the time of data collection. These two pages were created at the very beginning of the Umbrella Movement and mainly provided live information from the protest sites. They were prominent probably because events evolved quickly at the very early stage of the movement, creating a strong sense of uncertainty. Hence, people craved constant updates.

Table 1. Descriptive Statistics of Facebook Pages.

	M	*SD*
In-degree based on liking	2.12	2.09
Out-degree based on liking	2.13	4.75
In-degree based on sharing	3.47	11.00
Out-degree based on sharing	3.62	8.52
Time of page setup (Sept. 28 = 1)	22.96	21.18
No. of posts	142.76	172.78
Logged no. of people liking	7.29	1.67
% video	6.00	9.00
% photo	61.00	24.00
% graphics	37.00	26.00
Frequency of sharing		
Scholarism's contents	.51	1.72
HKFS's contents	.88	3.68
OCLP's contents	.15	.48

	%
Theme	
Art	20.3
Information updates	21.7
Experience sharing	26.1
Foreign support	10.9
Community issues	8.7
Location	
Clearly tied to an occupied area	36.9
Admiralty	32.6
Mong Kok	2.9
Causeway Bay	1.4
Liked	
Scholarism	6.5
HKFS	7.2
OCLP	4.3

Note. The five percentages in the bottom half of Table 1 do not add up to 100% because some pages do not belong to any one of the five categories.

In terms of thematic concern, more than one in four pages were about experience sharing (26.1%). More than 20% were for information updates (21.7%) and for art and creative work (20.3%). Only 10.9% of the pages were about offering support from outside Hong Kong, and 8.7% of the pages addressed community issues. The pages did not frequently share the contents of the movement leaders' Facebook pages: The average scores ranged from 0.15 to 0.88.

About one-third (36.9%) of the pages were classified as tied to physical activities within the occupied areas. Most of these pages were located in Admiralty (32.6% of all pages), 2.9% were located in Mong Kok, and 1.4% were in Causeway Bay. Last, for linkage with the three movement leaders, 6.5% of the 138 pages liked the Scholarism page, and 7.2% and 4.3% of the 138 pages have liked the HKFS and OCLP pages, respectively. These percentages are not large, indicating a weak tendency for the participant-initiated actions in the Umbrella Movement to connect themselves proactively with the movement leaders.

Predicting Degree of Connectedness of the Pages

RQ2 asks what factors could explain the degree of connectedness of the Facebook pages when they are treated as a network. Two node-level regressions were conducted with UCINET following the random permutation method, which accounts for the non-independence of the cases. The dependent variables are the in-degree scores based on liking and sharing. The independent variables are the time the page was established; the number of posts published; the number of people liking the page (logged); out-degree score; percentages of posts with videos, photos, and graphics; whether the page was tied to activities in the occupied areas; and thematic concerns. Table 2 summarizes the results.

Table 2. Regression of In-Degree Scores of Facebook Pages Based on Liking and Sharing.

	In-degree score	
	Based on liking	Based on sharing
Time of page setup	.11	−.10
No. of posts	−.09	−.08
Logged no. of likes from users	.59***	.01
Out-degree of liking and sharing	.22*	−.10
Like or share OCLP	.02	.01
Like or share HKFS	−.09	−.05
Like or share Scholarism	.09	.62**
% video	−.10	−.02
% photo	−.07	.07
% graphics	.00	−.08
Theme		
Art	.24*	.01
Information updates	.18	.17*
Experience sharing	.20	−.02
Foreign support	.09	.32
Community issues	.16	.22*
On the ground	.14	−.32
Adjusted R^2	.36**	.46*
F value	5.52	7.88

Note. Entries are standardized regression coefficients. $N = 138$. An analysis of the data, but with a different and simpler regression model without some of the key independent variables of this article, was presented by Lee and Chan (2018).
* $p < .05$. ** $p < .01$. *** $p < .001$.

The number of likes a page got from users was the outstanding predictor of liking-based in-degree. A page liked by more people was also liked by more pages. Besides, there is a significant positive relationship between liking-based in-degree score and liking-based out-degree score. Pages that reached out to others were more likely to be liked by other pages. The relationship hints at a degree of reciprocity in the relationship marked by liking. Whether the page had liked the three leaders' pages did not affect the degree of connectedness based on page liking. H1a is not supported. Not only did most of the pages not actively connect themselves to the leaders, but there was also no evidence that certain pages served as intermediaries between the movement leaders' and others' pages.

There is no relationship between liking-based in-degree and the characteristics of the posts published. Pages focusing on the theme of art and creative works were more likely to have been liked by other pages.

The second column shows that the factors predicting sharing-based in-degree scores were rather different. The number of people liking a page does not predict the sharing-based in-degree score. There is also no relationship between sharing-based out-degree scores and sharing-based in-degree scores. That is, there is no sign of reciprocity in sharing relationships. For a relationship with the three movement leaders, only the sharing of Scholarism's content was positively related to the sharing-based in-degree score of the page. H1b is at most partly supported.

Two other variables obtained significant coefficients. Pages focusing on providing information updates had higher sharing-based in-degree scores than pages with other foci. This finding suggests that information about immediate happenings in the occupied areas was treated as particularly shareworthy by the pages. Pages focusing on community issues also obtained higher sharing-based in-degree scores.

Predicting Connections Between Pages

H2a through H5b posit factors that could explain the interconnections among the pages. To tackle these hypotheses, quadratic assignment procedure (QAP) regression analysis was applied. QAP is a method of statistical inference that computes the statistical significance of parameter estimates when the dependent variable is a relational matrix (Krackardt, 1988). The goal of QAP analysis is to examine the degree to which the ties in the different networks are related to each other. For this study, a series of independent matrices were entered into the models, with the matrix of liking and the matrix of content sharing as the dependent variables.

The first QAP regression results on page-like relations revealed that a page was more likely to have liked another page if they shared a common movement label, shared a common thematic concern, and had a large number of commonly liked pages. Sharing common activity locations, however, did not affect whether the Facebook pages had liked each other. Therefore, H2a, H3a, and H4a are supported. H5a is rejected.

Table 3. Multiple Regression QAP of Network Connections.

	Page like	Content sharing	Content sharing
Common movement label	.03*	−.02**	−.02***
Common theme	.06***	.04***	.03**
Common liked pages	.10***	.01	−.01*
Being liked or being shared	.15***	.01^	.00
Time lag	−.00	−.01	−.01
Page like			.11***
Differentials			
Logged page likes from users	−.05**	−.03**	−.02*
No. of outgoing Likes by the page	.16***	.00	−.01
Number of posts	.02*	−.01	−.01
Shares per post	−.00	−.02*	−.02*
% graphics	.02^	−.00	−.00
% photos	−.01	−.01	−.01
% videos	.01	.00	−.00
Location	.01	.01	.01
Adjusted R^2	.07***	.01***	.02***

Note. Entries are standardized regression coefficients. $N = 18906$. No. of permutation = 2000.
^ $p < .08$. * $p < .05$. ** $p < .01$. *** $p < .001$.

In addition, Table 3 shows more direct evidence of the reciprocity of page liking. Whereas Table 2 shows that pages that have liked a larger number of other pages were also liked by a larger number of pages, Table 3 shows more specifically that if a page has liked a specific page in the sample, that specific page was also more likely to have liked the first page.

The QAP regression results showed that a sharing relationship is explained by sharing of common themes; that is, a page was more likely to have shared the contents of another page if the two shared the same thematic concern. This supports H3b. However, H2b, H4b, and H5b are not supported. Contrary to expectations, there was even a negative relationship between content sharing and sharing of a movement label; that is, a page was less likely to have shared the contents of another page if the two used the same movement label.

The second column of Table 3 shows that there is no relationship between content sharing and having a large number of commonly liked pages. However, the third column shows that, after controlling for whether the pages have liked each other, there was a significant, though weak, relationship between content sharing and number of commonly liked pages. It should be noted that a liking relationship itself is highly significantly related to a content-sharing relationship. This is an intuitive finding: A page was more likely to have shared the contents of another page if it had liked that page in the first place. Therefore, combining the first and third column, one can say that having a large number of commonly liked pages

has two separate and contradictory impacts on content sharing. On one hand, having a large number of commonly liked pages led to content sharing indirectly by enhancing the probability of establishing a liking relationship. On the other hand, it had a direct negative impact on the probability of content sharing.

Discussion and Conclusion

This study was motivated by a concern with the implications of having a wide range of individual- and small-group-based actions in large-scale protest campaigns. Decentralization is sometimes seen as an advantage of a connective action campaign or a networked social movement (Bennett & Segerberg, 2013; Castells, 2012), but it also brings about challenges. The array of individual- or small-group-based actions may strengthen the tendency of fragmentation or internal division if groups are splintered into clusters that map onto existing lines of internal conflicts.

In the case of the Umbrella Movement, our analysis of 138 participant-initiated Facebook pages showed limited amounts of mutual liking and content sharing. One argument is that there is little reason to expect strong connections among the small-group-based actions in a large-scale protest campaign. After all, the appeal of connective action is that people can develop their own modes of participation (Lee & Chan, 2016) without the need to connect their activities to many others. But the general lack of connections does mean that the resources and materials generated through the small-group-based actions were not widely distributed on online networks. This could have limited the potential persuasive and mobilizing power of the actions.

The analysis also shows that only a small proportion of the 138 pages were directly linked to the pages of the three movement leaders through page liking or content sharing. The regression analysis further shows that there was little relationship between the pages' degree of connectedness and the extent to which they liked or shared the contents of the leaders' pages. On the whole, the evidence pointed toward a general disconnection between the participant-initiated pages and the leaders' pages. Most of the participant-initiated pages simply focused on their own actions and activities instead of trying to help spread the messages of the movement leaders.

Moreover, this study examined the logic of interconnections among the participant-initiated pages. Based on the principle of homophily (McPherson et al., 2001), we expected pages sharing the same ideological predilection, having the same thematic concern, and having an association with the same geographical location to be connected with each other. The findings show some tendency for groups with similar ideological predilections to be connected to each other through page liking, but the degree of interconnection was not strong, and they did not tend to share the contents of each other more frequently. On the whole, the participant-initiated Facebook pages, because of their weak interconnections and weak connections with the movement leaders, might have contributed to the tendency toward movement fragmentation, but at least where social media interconnectedness is concerned, these weak connections were not very clearly and straightforwardly mapped onto internal divisions within the movement. Nonetheless, given the tendency for pages sharing the same ideological predilection to have liked each other, even though the participant-initiated actions did not strengthen ideological divisions within the movement, they did not help bridge the division.

Beyond its main findings and conclusions, this study also generates additional results that enrich our understanding of connective action campaigns and how people's actions interconnect on social media. First, there were variations in the Facebook pages' degrees of connectedness. Pages focusing on art and creative works were liked by larger numbers of others than pages focusing on other themes. McCaughan (2012) argued that art associated with social movements not only reflects but also constitutes the political and social change the movements have been seen to effect and are efforts to articulate the meanings of a movement. Our findings suggest that such efforts were particularly capable of obtaining recognition. Besides, pages focusing on information updates had their contents shared by others to a larger extent than pages focusing on other topics. This shows that some participant-initiated pages did play an important information dissemination role during the movement. Moreover, pages addressing community issues were also often shared. Because the Umbrella Movement used the occupation of urban space as its core tactic, participants took the opportunity to raise people's concerns with various issues in urban life. The findings suggest that movement participants did find the messages related to community issues particularly relevant and worth spreading.

Second, the current study's findings about homophily are actually more complicated than expected. On the one hand, pages sharing the same thematic concern indeed were more likely to have liked each other and to have shared each other's contents. This can be understood in terms of perceived relevance: For a page focusing on a specific theme, other pages focusing on the same theme are seen as providing relevant information and messages. The other pages and their contents are therefore more likely to be seen as worth following and sharing.

But on the other hand, although pages sharing the same movement label and pages having a larger number of commonly liked pages were more likely to like each other, they were less likely to share each other's contents. A plausible explanation is that when two pages shared the same ideological predilection, they were more likely to give recognition to each other through liking. However, the contents provided by pages sharing the same ideology might be largely similar. Content sharing is therefore undermined by redundancy. This explanation should be particularly pertinent to the impact of the number of commonly liked pages. That is, when two participant-initiated pages had liked and followed the same set of movement organizations, political parties, and media outlets, it means that they had the same set of information sources. Hence, the information provided by the two pages would be similar to each other, leading to redundancy and lesser likelihood of content sharing between the two. This post hoc explanation is analogous to the classic argument that strong ties may not be channels of new information (Granovetter, 1973).

Theoretically, these findings point to the need to differentiate types of connections among actors on social media. Relationships of liking signify mutual recognition, whereas relationships of content sharing indicate the extent to which the contents of the other are considered worth spreading. The latter is likely to be affected by considerations such as whether the contents of the other page are relevant, unique, and novel. We have just noted that pages with the same thematic concern were more likely to share each other's contents. This is probably because the pages focusing on community issues in the Umbrella Movement were often engaging in original projects related to the issues. The information they

provided was likely to be seen as relevant and novel by other pages sharing the same thematic concern. Content sharing was therefore not undermined by redundancy in this case.

The findings also point to the complexities in how homophily is manifested in social networks. In the present study, having the same thematic concern led to both liking and sharing, having the same geographical location did not affect liking and sharing, and ideological predilection led to liking but undermined sharing. Despite the general tendency for actors to be connected with similar others, not all characteristics matter in the same way.

Several limitations of the study need to be noted. First, the indicators used in the analysis are imperfect. The two indicators of ideological predilection—movement label and number of commonly liked pages—are either general or indirect. The fact that significant and meaningful findings can be derived means that they remain useful for the present study. Yet future studies can develop better indicators of the attributes of Facebook pages for analysis.

Second, the attributes of the pages were registered a year after the end of the Umbrella Movement (i.e., December 2015). For some pages, the scores on some variables—such as number of likes attracted by the pages—might not reflect the performance of the pages during the Umbrella Movement. These constitute limitations in the quality of the data. However, many of the key variables (e.g., thematic concern) are not time sensitive, and most of the core findings of this study involve the relationships among variables or the relationships among matrices. Although the time lag might have introduced measurement errors in some variables, we do not see how these errors might lead to alternative explanations of the core findings of this study.

Third, this study mainly focuses on homophily when examining the interconnections among the participant-initiated pages. Future studies can explore other issues and principles of the interconnections among movement-related Facebook pages. In fact, this study hints at a need to explore the hierarchy of the movement-related pages. In the network analysis, both liking and sharing relationships are explained by the differentials in page likes and differentials in shares. That is, a page was less likely to like another page and share the latter's content if the page had more likes and had their contents shared more frequently by others. In other words, the more prominent pages were less likely to like and share the contents of the less prominent pages. The question of hierarchy deserves focused examination in future studies.

This study can be considered an initial examination of the principles of interconnections among participant-initiated actions within a large-scale protest. It attempted an analysis that has rarely been done in the literature on the relationship between digital media and social movements. Despite the limitations, we believe that the principles of interconnections among the participant-initiated activities are a key to understanding the characteristics, power, and limitations of large-scale protests in the contemporary world. We call for more research attention on this problematic.

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