Bowling Together Again: Facilitating the Initiation of Collective Action through Awareness of Others

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Abstract

Often within communities there is sufficient interest in group-activities and yet they fail to occur because of insufficient individual initiative. This could be due to diffusion of responsibility or uncertainty about the availability of potential participants. Providing information about the number of interested individuals has conflicting implications, and hence an ambiguous impact on the likelihood of activities occurring. Our experiment examines the impact of providing information about community interest on activity initiation. Subjects (n=2000) were given information about the level of interest in a possible activity within their community and the ability to initiate its planning. Results indicate that displaying sufficient interest in an activity is positively associated with willingness to initiate planning. This suggests that Internet applications which 1) provide awareness of shared activity interest and 2) reduce effort required to initiate activity planning could boost collective action and improve community life.

1. Introduction

People often wish to participate in social-group activities within their geographic community related to their personal interests (e.g., volleyball, book clubs). Engagement in such activities is an important part of our social fabric with many direct and indirect benefits ranging from positive health impacts to growth of social capital [23].

A variety of social technologies like *Meetup* and *Eventbrite* aim to facilitate organization and participation in social-group activities. *Meetup*, in particular, has been successfully used to organize grassroots political action and currently supports over 600,000 monthly *Meetup* groups [27]. Yet despite the existence of these technologies, in many contexts people's desires to engage in social group activities are not being met [26, 27]. For example, users of *Meetup* are often unwilling to step forward and initiate the organization/planning of a new social group activity [26, 27]. This unwillingness to initiate activity planning could be due to various theoretical inhibitors, such as: 1) diffusion of responsibility (assuming someone else will take charge) [30]; 2) not having a minimum number of interested people necessary for the activity to happen [21]; or 3) a lack of awareness of other interested people, and therefore an unknown return on efforts to organize [27].

In this paper we explore these potential inhibitors through an experiment (n=2000) involving a user interface to manipulate awareness of individuals who are interested in a social-group activity. Results of the experiment inform user interface design regarding how to convey social-group activity interest from others in order to facilitate (and not inadvertently inhibit) a user's willingness to initiate organization.

The rest of the paper is structured as follows. First, we review background literature on theoretical facilitators and inhibitors of social-group activities and use this review to pose hypotheses for the experiment. The design of the user interface for the experiment is then presented, followed by the experiment itself. The results of the experiment are then discussed in light of system design and theory of collective action.

2. Background

In this section, we clarify the types of groups and group-activities that our study focuses on and review technologies available that support planning of these activities. We then reference prior work that indicates how users of these technologies are often unwilling to

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initiate organization of activities, and then delve into two theoretical facilitators/inhibitors of group activities that may influence this unwillingness.

2.1. Interest-Group Activities and Collective Action

Interest groups are defined by Merriam-Webster as "groups of people who identify with a specific interest (e.g., a hiking group has members who enjoy hiking)" [12]. Interest groups fall into two categories: 1) social groups and 2) activity groups. Social groups are "bond-based" [7], where personal social relationships with specific group members drive individuals' membership as opposed to any particular activity that the group engages in.

Activity groups are "identity-based" where individuals' membership is driven by the common theme of the group. Their motivation to participate rests with the group "activity" itself rather than with individual members. This paper focuses on identity - or interest-based activity groups. While there are some activity groups that are bond-based as well (e.g., they are started by a tight-knit group of friends), these groups are known to be harder for newcomers to join and integrate into because of the group members' strong bonds to each other [7].

The Theory of Collective Action [5] suggests two conditions that need to converge for an interest-based group activity to be actualized: 1) a critical mass of members, and 2) a shared vision of collective action (collective action goal). If only the former condition is met, an ineffectual "all talk, no action" group may result (e.g., online cat lover community). If a collective action goal is articulated ("let's form a baseball team") but an inadequate cohort of members has been accrued, the group will have no chance of achieving its collective goal. When both conditions are met, the group has a chance of persisting and functioning effectively.

Extensive literature on the economic and psychological conditions under which groups organize for collective action [e.g., 5, 8] supports the notion that critical mass and shared goals are importantly linked and can be usefully manipulated. First, minor interventions can facilitate collective action: relatively simple instructions, for example, can cause a group of walkers to walk in cadence with each other [20]. Second, consensus formation benefits from both information exchange among group members (influence) and from "exit" of dissenting members (the tendency of those who disagree from an emerging consensus to withdraw) [13]. Finally, Gold and Sugden's [6] observation that "public good" puzzles (e.g., prisoner's dilemma) can be rationally and optimally solved by agents who adopt the "team reasoning" stance (*"we should"* rather than *"I should"*) illuminates the ways in which membership (*"we"*) and collective goals (*"should"*) are intertwined for successful collective action [29].

Interest-based activity groups are action-oriented. This means the members of the group have an agreed-upon goal [29] and a shared intention to carry out that goal (called "we-intentions" [2]). For example, a hiking group with a shared intention to go on hiking trips would be action-oriented. A hiking group that merely shares an interest in hiking but does not plan to engage in particular hiking activities together (e.g., an Internet message board) would not be considered action-oriented because it is missing a we-intention.

2.3. Coalescing Tools for Social Group Activities

Online communication offers several means of coalescing [1] the necessary participants for interest-based group activities, most notably Event-Based Social Networks (EBSNs) [27]. Examples of such systems include *Meetup*, *Plancast*, *Eventbrite*, and (to a certain extent) events pages on *Facebook*. These systems provide an online platform for users to create, distribute, and organize interest-based group activities (which generally occur face-to-face). Most commercial EBSN applications were designed for social structures where there is a main organizer of the group-activity (leader) who is willing to make significant investment to actualize the activity. The organizer typically makes decisions on their own about details of the activity (e.g., when/where).

Research on EBSNs has focused on enhancing social engagement through recommendations to users concerning group activities that have already been planned or activity-groups that already exist and have several members [3, 16, 17].

Yet what if there are no existing activity-groups or group activities already planned for one's interest? Recent work involving *Meetup* highlights how most individuals are unwilling to step forward and initiate the planning of a new interest-based group activity [26, 27]. It is not clear, however, which factors spur this reluctance to initiate activity planning. Is it the effort involved or lack of awareness of those with a shared interest in the activity? An understanding of such factors can inform improvements to system design in order to better facilitate or encourage users to initiate planning of activities that interest them.

2.4. Impact of Critical Mass and Free-Riding on Collective Action

The Theory of Collective Action [5] posits that a group of individuals can come together to accomplish a goal (such as actualizing a group activity) only if there is a critical mass of members sharing the same goal.

The term critical mass refers to a sufficient number of individuals who engage/adopt an idea or innovation so that the action becomes self-sustaining and creates further growth [18, 19]. What constitutes "critical mass" has varied over time with two distinct perspectives dominating. The first is a simple threshold model, and the second an action/response production function.

The oldest model of critical mass, the threshold model, was mentioned in relation to collaborative computing by Licklider in 1968 [15]. He suggested that computer mediated communication was constrained by the necessity for a "*critical mass*" or minimum number of people to be available online for the solving of various problems. This was followed by the observations made by Hiltz and Turoff in the early 1970s regarding computerized conferencing systems that some discourse groups were simply "too-small" to sustain interactions [9]. They hypothesized that computerized conferences with less than 8 to 12 active users would not have "critical mass" and would eventually fail to produce enough new material to justify users' continued participation. Palme [22] expanded Hiltz and Turoff's early work [10] and proposed a linear 'communication response function' to explain the group size threshold for sustainable computer-mediated communication (CMC).

When applied to interest-based activity groups, reaching (and exceeding) a critical mass or minimum number of potential participants needed for an activity to occur should increase one's tendency to initiate organization of the activity. This is because as the number of interested people rises, there is an increased likelihood that enough people will show up for the activity should the details (e.g., when and where) be organized. This, in turn, can make would-be organizers more confident that efforts put into organization will culminate in an actualized activity.

Simply increasing the (known) number of people interested in an activity may not necessarily improve its chances of occurring. One potential inhibitor of collective action initiation (i.e., assuming the role of activity organizer) is free-riding [30]. Free-riding refers to the reduction in effort from individuals when part of a collective. The classic example used to illustrate this phenomenon is a "tug-of-war" rope pulling game, where individual effort is known to decrease as the group size increases [14]. There are many situations in which free-riding occurs and a variety of explanations have been put forward. One is that as group size grows, individuals tend to reduce their effort because they are less accountable or less visible in a larger group [4]. Relatedly, the bystander effect states that an individual will be less likely to act in a situation when others are present [14] (e.g., the greater number of people that witness an accident, the less likely any will offer help). In the context of interest-based group activities, if potential participants are aware of a sizable number of other interested people—especially a critical mass of people needed—they may be less likely to "step up" as an organizer because they assume that other interested people will take on that responsibility. They can then "free-ride," or attend the activity without putting in much if any effort into its organization.

3. Hypotheses and Research Questions

The previous discussions of critical mass and free-riding pose different explanations or predictions for how *awareness of other (potential) activity participants* may influence one's own desire to "step up" and initiate organization/planning of an activity that interests them. We can hypothesize the following based on these theoretical facilitators/inhibitors of collective action initiation:

The impact of critical mass on collective action initiation

H1. Increasing the visible number of people interested in an activity beyond the minimum needed for the activity to occur will be positively associated with collective action initiation.

The impact of free-riding on collective action initiation

H2. Increasing the visible number of people interested in an activity beyond the minimum needed for the activity to occur will be negatively associated with collective action initiation.

H3. Providing indications that other interested people have initiated planning an instance of an activity will be negatively associated with collective action initiation.

Exploration of these hypotheses is intended to inform the design of Event-Based Social Networks (EBSNs) so as to better facilitate (and not inadvertently inhibit) willingness to initiate planning of interest-based group activities. As such, we also ask:

RQ1. How should interest in a respective group activity from nearby individuals be conveyed in order to encourage a user to initiate collective action?

4. Research Artifact

To test the aforementioned hypotheses, we designed a user interface (UI) that displays information about an interest-based activity that users wish to or currently do within a particular geographic area. Specifically, in response to a search for a particular activity in a preferred location (Figure 1 – *"tennis"* at/within *"jersey city"*), the interface conveys: 1) the number of people who also have an interest in doing the activity in the designated area (Figure 1 - *"Interested People (4)"*); along with any messages posted by those interested people regarding the activity interest (Figure 1 - *"Brainstorming"*), and any instances of activities related to the interest that are already in planning (Figure 1 - *"Hamilton Park Tennis"*).

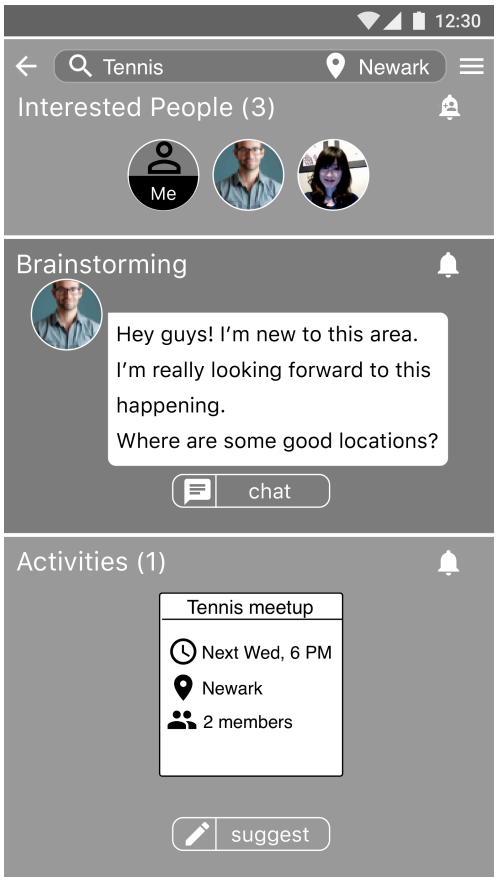

Figure 1. The UI for group-activity search results

Collective action initiation is operationalized in the interface as a "suggest" button at the bottom of the screen, which enables the user to create a new instance of the respective activity for planning.

The "Interested People" section served to test H1 and H2. Posts in the "Brainstorming" section and activities-in-planning in the "Activities" section were intended to serve as indications that other interested people have already initiated collective action (H3).

5. Method

We designed an online experiment to explore our hypotheses and research question. Subjects were exposed to the interface with the activity interest and location populated in response to survey questions. The number of other people shown to be interested in the activity, the existence of brainstorming text, and activities-in-planning were experimentally manipulated. These manipulations are discussed in detail below.

5.1. Procedure

Subjects were recruited through Amazon Mechanical Turk (see Subjects subsection for participation restrictions). Upon agreeing to participate, subjects were provided with the following prompt: "*list a social activity that you would like to do with a group of strangers near where you live, work, go to school, or hang out socially*." Subjects entered an activity description as well as a location for the activity that would be "*identifiable to a stranger*" in the nearby area (e.g., "play tennis at Hamilton Park").

Subjects were then asked about their perceptions of the minimum, ideal, and maximum number of participants for their respective activity. They also answered a series of survey questions about their level of interest in the activity and the extent to which they engaged in organizing such activities. Table 1 provides a summary of a number of key survey questions.

After the survey, subjects were provided with a use-case scenario in which they use a mobile app to search for their respective activity near the location that they previously inputted. They were then presented with a UI of the search results. These search results were experimentally manipulated generating 25 conditions.

Table 1. Variables regarding subjects' participation in their respective activity

Variable	Data type
Level of interest in the activity	Categorical (not at all interested, slightly interested, moderately interested, very interested, extremely interested)
Organizer history: how often one organizes this activity already	Categorical (never, rarely, occasionally, often/always)
How many other people one already knows with this interest	Categorical (0-1, 2-4, 5-10, 11+)
How often they participated in the activity in the past month	Continuous
How often they wanted to participate in the activity in the past month	Continuous

Table 2. Experimental Conditions

C	Interested People	Post in Brainstorming	Activity in Planning
1	No "Interested People" section displayed	No	No
2		Yes	No
3		No	Yes
4		Yes	Yes
5	1 (yourself)	No	No
6	1 less than minimum needed	No	No
7		Yes	No
8		No	Yes
9		Yes	Yes
10	Minimum needed	No	No
11		Yes	No
12		No	Yes
13		Yes	Yes
14	Ideal number	No	No
15		Yes	No
16		No	Yes
17		Yes	Yes
18	Maximum number	No	No
19		Yes	No
20		No	Yes
21		Yes	Yes
22	1.5x over maximum	No	No
23		Yes	No
24		No	Yes
25		Yes	Yes

Subjects were randomly placed in one of 25 experimental conditions where the displayed results of a search results that varied based on 1) the number of interested people shown, 2) the presence of a post in the "Brainstorming" section, and 3) the presence of an activity already in planning in the "Activities" section. These variations reflected different points in the critical mass function, enabling testing of H1 and H2. See Table 2 for a breakdown of these variations, and Figure 2 for examples of the interface variations. Whenever a brainstorming post was visible, it displayed the text: "*Hey guys! I'm new to this area. I'm really looking forward to this happening. Where are some good locations?*" Whenever an activity-in-planning was visible, its date/time was "*Next Wed, 6 PM*," its location matched the subject's search term, and the number of members matched the number of interested people shown minus 1.

Figure 2. Example of the UI without a Brainstorming post (left) and without an activity-in-planning (right)

After viewing the search results, subjects were asked if they would click a button in the UI to begin organizing a new instance of the activity (the dependent variable in our analysis - see Figure 4).

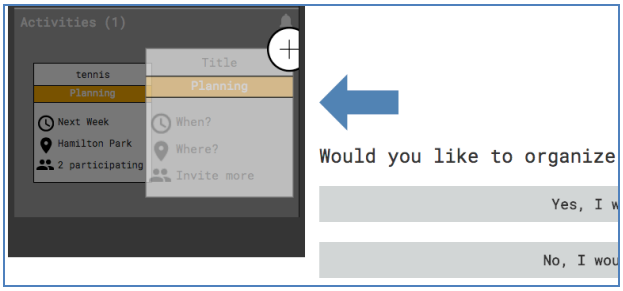

Figure 3. After viewing the contents of the UI, subjects were asked, "Would you like to organize a new activity for {the interest they typed in}?"

5.2. Subjects

Two thousand subjects were recruited through Amazon Mechanical Turk who satisfied the following requirements: they were between 18 and 33 years of age (to minimize the effects of age), they were a U.S. resident (to minimize the effects of location), they owned a smart phone (so the use-case scenario would be plausible), and they indicated being "very" or "extremely" interested in their respective activity (as the focus of the study was on spurring already-interested individuals to assume the role of organizer).

From the 2000 Mechanical Turk subjects recruited, 1173 subjects were removed for the following reasons: 1018 for bad activity or location (e.g., a location that was too vague such as "home" or an activity that is not done with strangers such as visiting one's family), 142 for nonsensical minimum, ideal, and maximum number of subjects needed for the activity (e.g., providing a maximum number of subjects that was lower than the minimum), and 13 for not answering portions of the survey. This resulted in a usable set of 827 subjects. There were between 25 and 43 participants per condition, with an average of 33 per condition.

Of the 827 subjects included in analysis, 57.2% were female and the average age was 27.4 years old. Regarding mobile phones, 54.5% of subjects reported owning an Android phone, 45.3% reported using an iPhone, and .1% (1 subject) used a Windows phone. Regarding highest level of education achieved, 39.9% had a Bachelor's degree, 6.6% reported having "some college" experience, 11.4% had an Associate's degree, 9.8% had a Master's degree, 8.1% had a high school diploma, 1.9% had vocational training, 1.8% had a doctorate degree, .4% had "some high school" experience, and 1 subject declined to answer. Regarding current student status, 17.4% identified as being full time students, 10.8% as part time students, and 71.8% did not identify as students. Regarding work status, 61.8% identified as working full time, 21.4% worked part time, and 16.8% did not work.

6. Results

Table 3 shows descriptive statistics regarding general tendencies to initiate collective action. We can see that 67% of subjects overall indicated that they would initiate collective action (through clicking the "suggest" button). That tendency increased based on the subject's history of being an organizer for the respective activity.

Table 3. Percentages of subjects that clicked the "suggest" button, delineated by organizing history

All	Never	Rarely	Occasionally	Often/ Always
67%	51.3%	59.3%	65.9%	83.7%
554/ 827	101/ 197	73/123	164/249	216/258

Types of activities that participants were interested in included sports/physical activities, music (e.g., playing instruments together), art/entertainment (e.g., visiting a museum), skill-building activities, discussion groups (e.g., politics), and parties/social gatherings (e.g., pub crawl).

To test the hypotheses and explore our research question, backward elimination combined with forced entry logistic regression modeling was performed on the likelihood that subjects would initiate collective action by clicking the "suggest" button (Figure 3). Control variables that were included in the regression modeling included: gender, age, history of participation in the activity, level of interest in the activity, organizer history, how many other people one already knows that share the interest, and participation differential (how many times the subject wanted to do the activity in the past month minus how many times they actually did do it in the past month). Explanatory variables of interest in the modeling were:

- **"Number of people needed in relation to number of people shown"**—a categorical variable regarding if the number of interested people seen in the "Interested People" section was (i) below the minimum needed, (ii) within and including the minimum and maximum number of people needed, or (iii) above the maximum number that can participate (H1 and H2)
- **Raw number of interested people shown in the "Interested People" section** (H1 and H2)
- A dichotomous variable for the **presence of a post in the "Brainstorming" section** (H3)
- A dichotomous variable for the **presence of an activity-in-planning in the "Activities" section** (H3)

The final model (Table 4) was statistically significant, $\chi^2(9) = 93.559, p < .001$. The model explained 17.8% (Nagelkerke R^2) of the variance in decisions to click the "organize" button and correctly classified 70.2% of cases.

Table 4. Final regression model

PREDICTORS	B	Wald	p	Exp(B)
Gender (male)	.353	3.362	.067	.722
Level of interest (extremely)	.313	3.089	.079	1.368
Organizer history (never)		**54.620**	**.000**	
Rarely	.388	2.165	.141	1.475
Occasionally	**.763**	**11.661**	**.001**	**2.144**
Often/always	**1.912**	**52.220**	**.000**	**6.765**
# of "Interested People"	**.040**	**12.463**	**.000**	**1.040**
# people needed in relation to # interested people shown (less than minimum)		**9.309**	**.010**	
Between min and max	-.048	.044	.834	.953
More than max	**-.783**	**6.216**	**.013**	**.457**
Presence of post in "Brainstorming"	-3.16	3.196	.074	.729
Constant	-.367	2.021	.155	.693

H1 - *Increasing the visible number of people interested in an activity beyond the minimum needed for the activity to occur will be positively associated with collective action initiation,* received partial support. Subjects were significantly more likely to initiate collective action as the raw number of people shown in the "Interested People" section increased. However, the variable for "Number of people needed in relation to number of people shown" did not produce the expected results (it would have been expected that subjects would be significantly more likely to initiate collective action when shown more than the minimum number of interested people needed). This variable is discussed more with the next hypothesis.

H2 - *Increasing the visible number of people interested in an activity beyond the minimum needed for the activity to occur will be negatively associated with collective action initiation,* received partial support. Relative to subjects that saw less than the minimum number of people needed for their activity in the "Interested People" section, subjects that saw more the maximum number of people that could participate in the activity were .457 times less likely to click the organize button. This suggests a tendency to free-ride specifically when the number of interested people is above the maximum that can participate.

H3 - *Providing indications that other interested people have initiated planning an instance of an activity will be negatively associated with collective action initiation*, was not supported. While the variable for presence of a "Brainstorming" post was in the final model, it was not significant. As such, H3 was not supported.

The regression model also found, as expected, that the control variables—the subject's history of organizing instances of the activity in the past—was statistically significantly. Specifically, subjects that indicated that they had "often" or "occasionally" organized instances of the respective activity in the past were significantly more likely to initiate collective action in the UI than subjects who had "never" organized instances of the activity before.

7. Limitations

This study is intended to inform the design and testing of an actual application for a field study. The research that was performed here was a first step in studying the proposed UI features. Nevertheless, there are some limitations that should be noted. To reduce subject fatigue, the survey collected binary responses for whether subjects would click the "suggest" button. More elaborate Likert-type scales could have asked about usefulness and other dimensions of use, which could have changed the results. In addition, subjects did not see real-world information in the UI, meaning there is a chance that some of the fabricated content in the UI appeared unrealistic to subjects, which could have affected their tendency to click the "suggest" button. Relatedly, subjects' stated preferences or actions (e.g., their choice to click the "suggest" button) may not necessarily match choices that they would make in actual instances of app-use. Lastly, subjects' general social interaction habits—such as how often they engage in social activities in general—were not probed for or factored into results.

8. Discussion and Conclusion

Social group activities are an integral part of our social fabric with many direct and indirect benefits ranging from positive health impacts to growth of social capital [23]. Technologies exist to facilitate organization and participation in such activities, yet there is evidence that such technologies fail to help users satisfy their group activity interests when existing activities and activity-groups do not already exist [26, 27]. Users have expressed an unwillingness to "step up" and assume the role of organizer for activities that interest them [26, 27].

In both offline urban communities (e.g., a college campus [26]) and online coalescing communities (e.g., Meetup.com [27]) it has been found that most individuals do not want to organize activities because of the amount of time, effort, and responsibility

required to ensure the activity happens. Often, potential organizers do not have awareness of shared community interest for an activity. This prevents them from trying to find others, in the belief that it will take too much effort.

The experiment reported in this paper aimed to understand how awareness of interest from nearby people in a particular group activity may facilitate a tendency in individuals to initiate organization of the activity. Interestingly, the study found partial support for seemingly contradictory influences on tendencies to initiate organization: critical mass and free-riding.

In support of the critical mass perspective, subjects were more willing to initiate planning for an activity as the visible number of interested people nearby increased. Subjects may have considered higher numbers of interested people to be an indication of a greater chance that people would actually attend the activity should it be organized. This, in turn, could have made would-be organizers more confident that efforts put into organization will culminate in an actualized activity.

Yet the results also indicated that showing too many interested people can be detrimental for tendencies to initiate activity organization. Specifically, subjects that were shown a number of interested people that surpassed the maximum number that could participate were significantly less likely to initiate organization than subjects that saw a number of interested people that was less than the minimum needed. This suggests that individuals are more willing to free-ride and let others put in the efforts to organize when interested people outnumber the maximum spots for the activity.

In terms of the design of systems that facilitate the occurrence of interest-based group activities (RQ1), the results of this study suggest that making users aware of nearby individuals who share their interests is a promising avenue to explore. For example, while popular applications like *Meetup* actively encourage users to start groups related to interests that they search and receive unsatisfactory results for, users have little idea if their efforts to organize will result in activities actually occurring. Emphasizing to users that other individuals have expressed interest in the respective activity (e.g., "4 other users in your area want to do this activity") may be the push users need to make their activities happen. This design approach may work best for activities that do not have exorbitant interest, as conveyance of too much user interest may backfire and result in freeriding.

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