

# Groups in Mendeley: Owners' Descriptions and Group Outcomes

**Wei Jeng**

University of Pittsburgh  
135 N. Bellefield Ave.  
Pittsburgh, PA  
wej9@pitt.edu

**Daqing He**

University of Pittsburgh  
135 N. Bellefield Ave  
Pittsburgh, PA  
daqing@sis.pitt.edu

**Jiepu Jiang**

University of Pittsburgh  
135 N. Bellefield Ave  
Pittsburgh, PA  
jiepu.jiang@gmail.com

**Yang Zhang**

University of Pittsburgh  
135 N. Bellefield Ave  
Pittsburgh, PA  
yaz44@pitt.edu

## ABSTRACT

Using four factors borrowed from traditional social group theories, we examined owners' group descriptions in Mendeley to study the applicability of traditional social group theories for large, loosely-formed online groups. We manually annotated the descriptions for 529 Mendeley groups, and correlated the appearances of the factors with two measures of the groups' outcomes: the changes in the numbers of group members and the changes of the articles shared within the groups between 2011 and 2012. Our results suggest that, in general, all four factors are important in online groups, which indicates the usefulness of traditional group theories in the study of online groups. In addition, although a majority of the factors have helped the growth of group size being higher than average increase, several factors have caused the increase of the shared articles within the groups to be smaller than average increase.

## Keywords

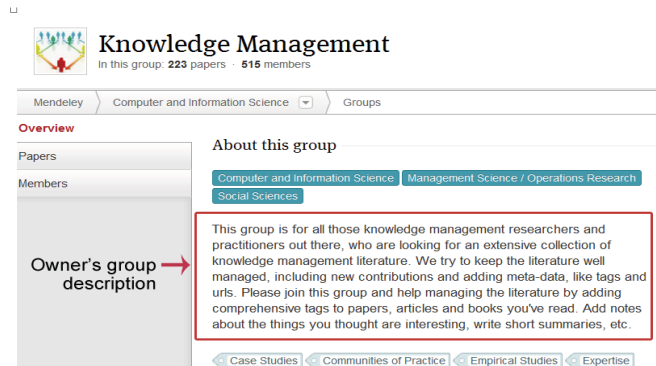
Academic social networking services, online groups, scholarly communication, Mendeley

## INTRODUCTION

Social network services (SNS) changed not only our daily lives, but also our professional activities. Scholars in the social media age may communicate and collaborate through SNS by sharing resources and forming online groups. Such scholarly activities are ubiquitous and have been studied recently in both general SNS websites such as Facebook and Twitter (Letierce, Passant, Breslin & Decker, 2010; Priem & Costello, 2010), as well as in those specifically for academic purposes such as CiteULike and Mendeley (Jiang, He, & Ni, 2011; Oh & Jeng, 2011).

Mendeley (<http://www.mendeley.com/>) is a typical Academic SNS (ASNS) website that allows professional users to post articles and to form online groups. Many users take advantage of Mendeley groups. Through our study, we know that the number of Mendeley public online groups has increased from 21,906 on May 18, 2011 to 34,508 on May 25, 2012, a growth rate of 57% in about one year. This suggests that online groups are active components in ASNS.

Figure 1. Example of a Group Description on Mendeley



Our study focuses on online groups in Mendeley. Mendeley groups, like most other online groups, are informal, loosely-organized, and feature a lack of strong commitment on the part of users. Thus, their collaborations differ from the formal collaborations in the literature such as co-authoring and collaboratively hosted projects (Wu, He, Jiang, Dong, & Vo, 2012). Our work will benefit the exploration of scholars' collaboration on ASNS.

## METHODOLOGY

The exact nature of forming online groups in ASNS requires further investigation; therefore, our study takes the angle of examining the applicability of existing social group theories, which often draw conclusions from small and well-organized groups, on large and loosely-connected online groups. If those theories can be applied to ASNS groups, we will have a theoretical basis for further studies.

According to theories on traditional social groups (House, 1996) and organizational behaviors (Baker & Ganster, 1985), there are two important factors that have a substantial influence on a group's overall outcome. The first one is the group leader's communication style, and the other is the group's goal as mutually committed between group leader and the members, and among the group members. Therefore, we specifically study the Mendeley group owners' descriptions about their groups.

As shown in Figure 1, a group description is an introductory narrative written by the group owner, whose goal is to inform other users about the expected objectives of the group. Although users may join a group for various reasons (e.g. other users' recommendations), it is reasonable to assume

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that the majority of users would read group descriptions and agree with the group's objectives before they join a group. Thus, to some extent, the owner's group description is indicative of: 1) the group owner's communication style; and 2) the general goal of the group as mutually committed between the group owner and members, and among different group members.

Finally, we want to examine the connection between the owner's group description and the group's outcomes. Bozeman and Corley (2004) state that two general objectives of online research collaboration are sharing academic literature and constructing professional network ties to increase one's scientific and technical human capital. We, therefore, employed two measures of group outcomes: the growth of shared articles (i.e., community literature) and the increase in the number of group members (i.e. network ties).

### GROUP DESCRIPTIONS AND TYPES OF FACTORS

To conduct our study, we collected Mendeley group descriptions, the number of group members and the amount of shared articles in May 2011 and May 2012, respectively. The different time periods enabled us to calculate the growth of group members and shared articles.

In order to focus on more content-rich and self-represented narrative data, we sorted group descriptions by their length and selected 529 groups from a larger set of 7,759 groups. This sample set includes all groups with descriptions that are 19 words or longer, with the longest description containing 90 words.

Drawing from previous studies of social group theories and online communities, we identify four factors: *directive leader demands*, *achievement-oriented goal setting*, *affective ties*, and *self-presentation*. These factors represent the owner's communication style and the methods of presenting the group goal, both of which would influence the mutual understanding between the owner and the members and among members.

Two researchers coded each selected description in order to minimize the chance for personal bias and human inconsistency. The coding involved reading the descriptions and identifying instances of the four factors in the descriptions. A description can have multiple instances of the same or different factors. The inter-rater agreement rate was 84.78%. The coders then agreed on all annotations on the descriptions through discussions. The details of the selected factors are presented below.

#### Factor 1: Directive Leader Demands

Previous research such as path-goal theory (House, 1996) has shown that if a group leader provides specific guidance and informs group members of exactly what they are expected to do, it could result in a successful group performance or goal attainment.

We identified an instance of directive leader demands when a group description explicitly states the scope of the group collection through direct demands or recommendations. For example, the owner of the Physics Nobel Prizes group asks

members to "...drag in a document that's relevant to the research that a person won the physics Nobel Prize for, and tag it with the year they won. [sic]"

Common types of demands in this category include several sub-categories: specific keywords (N=185, 35.2%); disciplines or domains (N=81, 15.4%); the original venues of the articles such as journals, proceedings or institutions (N=39, 7.4%); and specific authors (N=13, 2.5%).

#### Factor 2: Achievement-oriented Goal Setting

Researchers find that clear presentation of achievement-oriented goals can be effective in various goal orientation efforts and may affect group outcomes (Seijts et al., 2004; Locke & Latham, 2006).

Many Mendeley group descriptions include *goals* or *visions*. Some group owners address their group's *goals* in a concrete and clear style (N=62, 11.8%). For example, the "altmetrics" group states that it likes to "discuss new approaches to the assessment of scholarly impact based on the new metrics [sic]" (e.g. readership, blogging) in academic contexts." Compared with groups with "directive leader demands", the goal setting is usually defined in more general terms. Members' understanding of the goals may differ from each other, but general consensus exists.

Other groups have a relatively ambiguous *vision* (N=19, 3.6%). For example, "... to support ourselves in keeping an overview of the current literature, broaden our knowledge of the field, and have fun with science. [sic]"

#### Factor 3: Affective Ties

As an expansion of the intergroup contact theory, Pettigrew (1998) finds that positive emotions and affective ties play important roles in intergroup contact, which may have a positive effect on the group.

In our observations, 77 groups' descriptions (14.6%) included emotionally supportive messages or *affective encouragement*, for example, "...tools to help physician reading and writing papers. I'll be happy to learn with you, starting with those basics papers. Enjoy. [sic]". As indicated from the quoted sentences, most of these descriptions do not utilize the passive voice but use "I" or "we" to engage audiences in a direct and warmer way.

Eleven groups (2.1%) also attached short but *warm greetings* such as "May we all have fun [sic]" and "Enjoy! [sic]," which presents a little different feeling than other groups we investigated.

#### Factor 4: Self-presentation

In sociology, self-presentation is a key component in constructing personal identity and building relationships with others. Potential motivations for self-presentation of the leaders in online communities include reducing role ambiguity and convincing subordinates (Greene, Derlega, & Mathews, 2006; Butler, Sproull, Kiesler & Kraut, 2002).

Self-presentation is also a basic feature found often in user profiles on most SNS (Gibbs, Ellison, & Heino, 2006).

Top-level factors and % (N=526)	Sub- factors	N	%
Directive descriptions (N=275, 52.3%)	Keywords	185	35.2
	Disciplines	81	15.4
	Venues	39	7.4
	Authors	13	2.5
Achievement-oriented descriptions (N=69, 13.1%)	Specific goal	62	11.8
	Vague vision	19	3.6
Affective-motivational descriptions (N=77, 14.6%)	Warm greeting	11	2.1
	Affective Encouragement	77	14.6
Self-presented descriptions (N=33, 6.3%)	Self-introduction	14	2.7
	Self-duty	25	4.8

**Table 1. The frequency table of factors**

Factors of Group Descriptions	$\Delta$ group size			$\Delta$ collection size		
	Mean	SD	p	Mean	SD	p
Directive	10.33	36.20	<.001**	36.54	278.51	.02*
Achievement-oriented	11.26	25.59	.003**	13.26	38.57	.11
Affective-tied	17.56	47.43	<.001**	15.97	96.94	<.001**
Self-presented	10.00	22.98	.49	7.55	31.57	.01*
All samples (N=526)	7.84	30.77	--	35.82	331.27	--

(\*:  $p \leq 0.05$ ; \*\*:  $p \leq 0.01$ )

**Table 2. Group outcome comparison among factors**

Mendeley group owners can present their brief personal information such as name, title, discipline and photo at the right side of the group page. However, we still found a few group owners who tried to identify their real world roles in their group's descriptions (N=15, 2.8%). For example, the owner of the "Neuro-Disease" group indicates that he is a class instructor by saying: "I'm not a clinician nor a specialist in this field, but I teach Intro to Neuroscience and Behavioral Neuroscience [sic]".

In addition, we also marked some group owner descriptions because they explicitly revealed the owners' management duties or maintained routines (N=37, 7%). For example, "I will be adding many more as I make my way through a Computational Neuroscience textbook. [sic]."

## RESULTS

Table 1 presents the number and the percentages of the group descriptions that contain each factor and sub-factor. Note that one group description can have multiple instances of different factors or sub-factors. Thus, the sum of the number of factors can exceed 529, and the sum of the number of each sub-factor may exceed the number of a factor.

As shown in Table 1, all four factors have multiple instances identified in our study. This reveals that these factors are still relevant in online groups even though they were extracted from traditional small tightly-formed groups. Directive descriptions have the largest number of instances among the four factors, and the keywords sub-factor has the largest number among all the sub-factors. So it seems that

most group owners find it to be useful to directly state their demands or needs, and keywords are still the common method for identifying topics and disciplines.

Achievement-oriented descriptions and affective descriptions are the two factors with roughly the same popularity among the descriptions. Because specific goal sub-factors exist in a majority of the achievement-oriented descriptions, it seems that group owners state a specific goal than a vague one more often in Mendeley groups. The fact that groups with affective-motivational descriptions all have affective encouragement may indicate that encouragement is probably an effective way of enhancing online participation in light of the fact that some traditional enforcement methods are not applicable in online groups.

Self-presented descriptions have the least number of instances. Perhaps this is because it is somewhat redundant, considering that the owner profile is readily available. However, the owners often take this opportunity to define their own duties rather than just present extra personal information beyond profile.

Table 2 shows the connections between the four factors and the outcome of the groups measured by the changes of *group size* ( $\Delta$  group size) and the changes of their shared-article size ( $\Delta$  collection size). A Mann-Whitney *U*-test was conducted to indicate whether having a specific factor would generate significant difference when compared to the lack of the factor. To illustrate the impact of the factors, we also list the changes in group size and in shared articles for all sample groups in the last row of Table 2.

Measured by the change in group size, all factors except self-presented generated significant differences, which indicates that they are important in influencing the group sizes. By comparing to the mean increase of the group size of all the groups, we know that having any of the factor helped to increase of the group size to be higher than the average increase, which means that these factors help to increase the group size more dramatically.

Measured by the change in shared-article collection size, again all but one factor generated significant differences. In this case, the factor that fails is achievement-oriented. Another difference is that the results obtained from the change in the shared articles show that only having the directive factor helped to have higher increase of the shared articles than that of the average increase of all the groups, whereas the remaining three factors all resulted in a smaller change in the size of shared articles. Affective factors have significant impacts on both measures, but they helped to obtain higher increase on group size while having smaller increase on the shared articles. This might indicate that they help to build network ties, but are not helpful in encouraging people to share and add the papers.

Comparing between the two measures, only the directive factor has significant impacts and helped to trigger bigger than average changes. Considering that it is also the most popular factor, it should therefore be the focus of future study on communication styles in online groups.

## DISCUSSION

As stated earlier in this paper, one goal of this study is to examine the applicability of some social group theories in online groups setting. Our results show that the factors drawn from those theories all have reasonable numbers of instances identified, which indicates the usefulness of these theories in studying online groups. Therefore, applying group theories to ASNS is a valid research approach.

However, although our results suggest that these factors are important in online groups, not all of them relate to obtain higher than average growth of the groups. It seems that these factors are more beneficial in helping to increase the size of the groups, but most of them cannot generate higher than average increase on group shared articles. Further study is needed to determine the reasons for these differences.

Further, because affective-motivational or self-presented descriptions often help to produce higher than average increase in the group member size, but not in the collection size, it may suggest that the nature of groups with *affective-motivational* and *self-presented* descriptions may be very different from those with *directive demands* and *achievement-oriented* descriptions. The former may seldom denote any specific professional objectives, but act more as a social platform for networking among researchers. Therefore, it is important to recognize the different motivations and natures of online groups, which may call for different methods to study groups with diverse motivations in the future.

Borrowing a concept from the field of Library and Information Science, the owner of the group can be seen as the curator of a collection and the owner's group description can be viewed as the description of the scope, the management plan and the general policy of the collection. However, it is unlikely that a majority of the owners have sufficient knowledge of managing and curating a collection. Therefore, whether and how the library profession and librarians can help in this area is an interesting and important issue to discuss and explore.

## CONCLUSION

In this paper, we conducted a preliminary exploration of online groups in Mendeley. As collaboration platforms in an academic social network service site, groups in Mendeley provide us with the opportunity to study the applicability of traditional social group theories for large, loosely-formed online groups.

Using four factors borrowed from traditional group theories, we manually annotated owners' group descriptions for 529 Mendeley public groups. Then, we correlated the appearances of the factors with two measures of the group's outcomes: the changes in the numbers of group members and the changes in the group shared articles. Our resulting analysis suggests that, in general, all four factors are associated with the outcomes of online groups. In addition, although a majority of the factors is connected to generate higher than average growth in group size, directive, affective-motivational and self-presented factors generated lower than average increase on group shared articles.

Future work should include a more careful study of the different motivations of online groups, as well as the further exploration of the communication styles within the groups.

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