Social Comparison or Social Loafing: A Study of Anonymous Ideation in Virtual Teams

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Abstract

This study investigated the effects of social comparison and social loafing on group performance when groups engaged asynchronously in idea generation. The preliminary test result indicated that the effects of social comparison and social loafing co-existed, group members may have chosen to engage in different behaviors (social loafing vs. social comparison) in different group interactions, however, their choice did not seem to affect the number of solutions generated. On the other hand, group members tended to elaborate on the ideas that were generated by co-workers. As a result, groups with less social loafing produced richer elaboration on ideas generated.

1. Introduction

Virtual teams and virtual teamwork are pervasive organization phenomenon nowadays (e.g., [4]; [20]). Whereas a team can be viewed as “a group of people who work toward a common goal”, teamwork “is the process that a team employs (including both individual and group activities that team members engage in) to achieve that goal.” [2] Some researchers regard a virtual team as a team that relies heavily on computer-mediated communication (CMC) regardless of the geographical locations of the team members. Moreover, some researchers also define virtuality as a continuum rather than a point, and the level of virtuality can be determined by three dimensions: the degree of synchronization, the presence of nonverbal and para-verbal cues, and the extent of using CMC (e.g., [1], [13], [10]). In this paper, we use the term “virtual teamwork” to refer to teamwork that is conducted via CMC regardless of team members’ geographical locations. As a result, virtual teamwork is an integral part of any teams, even for teams that are co-located. In fact, virtual teamwork is becoming the norm and not the exception ([28] p.5).

However, understanding how virtuality affects group dynamics and group performance is far from well-established. To gain understanding of virtual teamwork, researchers have investigated how virtuality, group/team set up (composition, history), culture (e.g., organizational, and national culture), and other factors influence group interactions and group performance in the aspects of communication, coordination, and decision making. In this study, we investigate how virtuality affects ideation, a process of decision making. We choose to study decision making because it is the core aspect of any teamwork. The purpose of having a team is to make a decision or solve a problem, and solving a problem usually involves decision making. One of the fundamental mechanisms of decision making or problem-solving is ideation. Ideation, also known as brainstorming, is “the process of generating or conceiving of new ideas and concepts that may be useful when addressing a problem or opportunity toward the attainment of some desired state or outcome.” [21] Decision making processes and problem-solving processes typically involve coming to understand the problem, generating possible solutions, generating objective assessment criteria, and evaluating and selecting the best solution [22]. Teams then make plans, take actions, and review outcomes to determine whether the actions have resulted in desired effects, and what additional problems may be worthy of attention in the future. Ideation is a core aspect of all these team activities.

Previous research about technology-supported ideation indicated that anonymous input increased group ideation performance. However, these studies were frequently conducted in a face-to-face (FtF) setting, and they only focused on two effects: evaluation apprehension and social loafing. When teams engage in ideation asynchronously, there could be factors that render the effect of anonymity, making it more or less effective than in FtF interactions. In this study, we propose to consider a third effect – social comparison – when exploring how groups perform during asynchronous ideation. In the next section, we summarize previous studies of ideation in
IS research, and explain the theoretical foundations, research hypotheses, and research questions. Then we describe the study design followed by the study results. Finally, we discuss the study limitations, contributions, and future research.

2. Study Background and Research Hypotheses

In the research area of information systems (IS), many ideation studies have investigated computer supported ideation by using Group Support Systems (GSS) or Electronic Meeting System (EMS). While GSS research has studied a number of tasks, a large number of studies have used ideation as a task or subtask [6]. Researchers investigated a variety of factors that could influence group ideation results. These factors can generally be grouped into four categories: task (e.g., task structure, complexity), group (e.g., group proximity, size, skills, history, composition), media/technology (e.g., FtF group without EMS support, FtF group with EMS support, technology features used), and context (e.g., duration, rewards, history, culture, evaluative tone) [14, 15].

With globalization of business and advancement of technology, distributed teams or virtual teams are more frequently used to solve problems in organizations. Virtual teams potentially offer a major advantage over co-located teams for problem-solving. The organization can draw in people from a wider pool to build a team with more diverse expertise, experiences, and backgrounds, and therefore a wider variety of perspectives. Such teams may be able to work in broader problems and solution spaces as they seek and implement solutions. In other words, virtual teams may have a higher possibility for better problem solving.

On the other hand, one of the disadvantages of virtual teams is that the opportunity for FtF interactions in virtual teams is greatly reduced or even eliminated, forcing teams to rely on computer mediated communication (CMC) heavily if not entirely. However, CMC may not be less effective than FtF communication for certain tasks. Studies that investigated different communication modes (FtF, synchronous, asynchronous, or combined) (e.g. [3], [16], [17], [18]) indicated that asynchronous groups achieved similar performance as FtF groups or synchronous-distributed groups in terms of quality and creativity when the groups engaged in problem solving or decision making that consisted of ideation as a subtask. Two of these studies indicated that asynchronous groups produced more creative solutions than FtF groups ([16], [18]).

When virtual teams engage in CMC, it will be either synchronous distributed communication (e.g., phone calls, video conferencing, Web conferencing), or asynchronous communication (e.g., email, online bulletin board, online forum). Utilizing asynchronous communication for ideation is convenient for virtual teams when it is difficult to use synchronous communication since team members may have tight schedules or be in different time zones. It is unclear whether techniques proven to be effective in FtF interactions are still effective in asynchronous interactions. For example, previous research indicated that anonymity could be used to increase group ideation performance in FtF interactions. Does anonymity have the same positive effect on performance of asynchronous groups? In this paper, we attempt to address this question by first investigating how two effects caused by anonymity - social comparison and social loafing - affect group performance when groups interact asynchronously.

2.1 Anonymity and Productivity in Ideation

As specified by Vreede and Briggs [27] (illustrated in Figure 1), anonymity afforded by collaboration technology may have two opposing effects: increased social loafing and reduced evaluation apprehension. Social loafing (also called social ride or free ride) refers to a phenomenon that individuals tend to expend less effort in group tasks than they do in individual tasks, unless their contribution can be specifically identified and evaluated, or unless they believe that their contribution is critical to the success of the task, see e.g. [5], [9], [11, 12], [19], [23], [24].

![Figure 1. Impacts on Ideation Productivity (Adapted from [27])](image-url)

On the other hand, when participants contribute to ideation anonymously, they may not experience evaluation apprehension, which is the anxiety "induced in a person performing some task while being observed by others and feeling anxious about being judged or appraised by them." [8] Thus, according to Vreede and Briggs [27], the outcome with anonymous brainstorming “may be the net of two opposing effects of anonymity”. However, we propose that a third effect - social comparison effect - needs to be included in the
model, in addition to the effects of evaluation apprehension and social loafing.

Social comparison is a theory of motivation used to predict levels of effort. It is “a phenomenon wherein people match their rate of performance to the rate of the people working around them. Participants working in an environment where others are performing at a high level also tend to perform highly. Participants working in an environment where others are performing at a low level match the inferior performance rate (7)).” [25]

The effect of social comparison could be positive or negative on group performance. One social comparison study in ideation[25] tested the positive effect of social comparison and illustrated how social comparison can be invoked to improve anonymous idea generation in a FtF setting. By constantly presenting idea generation groups a feedback image with an imaginary “average” or “baseline” group performance, they invoked the social comparison among groups, and therefore increased the number of solutions by 63%. Another study in ideation [26] tested both the positive and negative effects of social comparison. The study found that the performance of individuals with high cognitive ability could be enhanced when given high-quality stimuli or be inhibited when exposed to low quality stimuli. In other words, when a group member perceives other group members’ performance is high, she may improve her behaviors to match; when she perceives that other group members’ performance is low, she may lower her performance to match as well. Since both studies utilize anonymous input, therefore, social comparison could be a group effect that is introduced by anonymity just as the effect of social loafing. As a result, the relationship between anonymity and group performance or productivity is illustrated by figure 2, which is a revised model from [27].

![Figure 2. Impacts of Anonymity on Ideation Productivity](image)

Previous studies focused primarily on the effects of evaluation apprehension and social loafing, and little research has been done to investigate how social comparison affects individual performance within a group. These studies indicated that “the benefits of reduced evaluation apprehension may outweigh the losses from social loafing.” [27] Therefore, anonymity has positive effect on group performance. However, anonymity may not have this positive effect in asynchronous interactions if group members have different perceptions about evaluation apprehension, social loafing, and/or social comparison.

First, people may experience less evaluation apprehension in asynchronous interactions than in FtF interactions. In FtF interactions, people have stronger sense that their performance is being observed by others, and inappropriate behaviors are more likely to get negative attention or criticism. When group interact asynchronously, they have much weaker sense that their performance is being observed, and inappropriate behaviors are less likely to get negative attention or criticism. Even if there is criticism about their behaviors, the criticism may not appear as embarrassing as it is in FtF interactions. As a result, anonymity may reduce evaluation apprehension to a much greater extend in FtF interactions than in asynchronous interactions.

Second, participants may perceive social loafing differently in FtF and asynchronous interactions. Social loafing may not be as a big problem in FtF interactions as it could be in asynchronous interactions. In FtF interactions, participants are usually able to see each other during the ideation process, and tell whether a particular person is contributing by watching over his/her shoulder accidentally or deliberately. If an unwilling participant does not type at all or pretends to be contributing by typing on a different user interface (such as an email program), people sitting nearly would know he/she is not contributing. The awareness of being watched or observed may create some normative pressure for people to contribute in FtF interactions. However, when groups engage in anonymous interactions asynchronously, there are fewer indications about the level of participation of individual group members. In this case, anonymity may create a much higher possibility for social loafing than in FtF interactions. Moreover, in FtF interactions, each member is committed to a task in a fixed period of time, while in an asynchronous setting, a member can freely choose how much time to be spent on a task and when. This flexibility may also create more opportunities for social loafing in asynchronous interactions.

Third, participants may perceive social comparison differently in FtF interactions than in asynchronous interactions. The ability to watch each other in FtF interactions makes the identity of each participant more salient and the effort they are making more visible than in asynchronous interactions. Therefore, FtF
interactions should have stronger social comparison effect than asynchronous interactions.

In summary, how anonymity works in FtF interactions may be very different from that in asynchronous interactions. The result that anonymity has increased the group performance of ideation in FtF interactions cannot simply be generalized to asynchronous interaction without further investigation.

In this study, we limit our investigation to how effects of social loafing and social comparison manifest and affect group performance in asynchronous interactions. In a follow up study, we will investigate all three effects: social loafing, social comparison, and evaluation apprehension. This paper only reports on the current study.

The effects of social loafing and social comparison have been subjected to extensive testing (e.g., whether the effects exist, under what condition, and how strong the effects are). However, these studies usually investigated the two effects separately in different studies. This is a limitation due to the fact that these two effects could co-exist, and potentially work against each other. For example, if a group of people engage in a group activity anonymously, a group member could engage in social comparison or social loafing. If she chooses to engage in social comparison, then she would match her level of effort with other group members. If others have done little, she would contribute little. If others have done a lot, she would contribute more. On the other hand, if she chooses to engage in social loafing, then she would contribute little when others contribute more. This example illustrates that the effects of social comparison and social loafing could work against each other, and individual group members may choose to engage in one of these behaviors. The question that which effect is stronger than the other in different group interactions remains unanswered in the existing studies. The investigation of the question is meaningful because we could increase group performance by minimizing or maximizing one of the effects if we understand how the two effects work simultaneously. The investigation is especially useful for virtual teamwork since individual’s contributions toward teamwork may not be as salient as that in FtF interactions, and there may be perceived more room for social loafing.

2.2 Research Hypotheses

In this study, we investigate how the two effects of social comparison and social loafing manifest in the following three conditions: 1) when there is no opportunity of social loafing, in other words, when a participant perceives that her co-worker does not contribute ideas; 2) when there is opportunity for social loafing, and the co-worker contributes little; and 3) when there is opportunity for social loafing, but the co-worker contributes a lot.

We speculate that in the context of group ideation, group members will behave differently in the above three conditions. In condition 1, when a group member sees that her co-worker does not contribute any ideas, she could engage in social comparison by matching her level of effort to the co-worker, in other words, she would not contribute any ideas either. However, if she still wants to earn credits for the group work, she would perceive that there is no opportunity to engage in social loafing. As a result, she may work hard to contribute ideas. In this case, the effect of social comparison will not manifest, and the effect of social loafing (not taking free ride) will manifest. In condition 2, when a group member sees that her co-worker has made some, but not much, contribution, then she may perceive that there is opportunity for social loafing. Moreover, she may choose to match her level of effort with her co-worker by contributing few ideas. In this case, both the effect of social loafing and the effect of social comparison may have negative impact on group performance. In condition 3, her co-worker contributes a large number of ideas, which creates opportunity for social loafing but also certain social norm pressure. It is more likely that the group member will match the level of effort with her co-worker by generating a large number of ideas. In this case, social loafing effect may not be evident, and social comparison effect may be strong. As a result, the group members in both condition 1 and condition 3 may perform better than those in condition 2. Therefore, we have the following hypotheses:

H1: Group members who perceive that their co-workers do not contribute will perform better than those who perceive that their co-workers contribute little.

H2: Group members who perceive that their co-workers contribute a lot will perform better than those who perceive that their co-workers contribute little.

As to which group members will perform better: condition 1 or condition 3, we speculate that when a group member sees her co-workers’ ideas, these ideas could inspire her to generate new ideas. As a result, we have the hypothesis:

H3: Group members who perceive their co-workers contribute a lot will perform better than group members who perceive that their co-workers do not contribute.
3. Study Methodology

For this study we conducted an experiment of three different asynchronous ideation approaches, which are referred as conditions later in the paper.

3.1 Subjects

100 students from four introductory MIS classes in a U.S. University participated in the study voluntarily. Students were told that they were randomly assigned to a group of several members to finish a group task. In fact, we only assign one participant to each group. Then we randomly assign “groups” into different conditions. There were 34, 33, and 33 “groups” in condition 1, 2, and 3 respectively. There is no difference of age (F= 0.91, p = 0.41) and number of years of working (F= 1.16, p = 0.32). The mean of age is 21.67, the mean of number of years of working is 2.34, across all three conditions.

In this study, we adopted a research design that uses simulated group interaction instead of real group interaction in order to strengthen the effect of different approaches. This kind of design – simulated group ideation with one person in a “group”- has been used in previous GSS studies, such as [26] . In their study, Valacich and other researchers investigated how quality of seeded ideas affected the quality of ideas generated by persons with high cognitive ability vs. low cognitive ability. A simulator was used to post ideas automatically so that participants felt that they were generating ideas with other group members synchronously. In our study, we manually seeded ideas asynchronously. Using simulated group ideation with only one person in a group could eliminate the confounding effects introduced to the experiment from real group interactions. As a result, our design isolates and strengthens the experiment effect.

3.2 Task

We created a task for the study. The task required participant to generate solutions to ease or solve a number of problems faced by public schools in the United States: low academic performance compared with other industrialized countries, high dropout rate for high school students, teen pregnancy, and campus violence. We chose this task because it has a large number of possible solutions, and the use of seeded ideas will not limit the number of ideas that could be generated by participants.

3.3 Procedure

Students used a Web-based GSS\(^1\) to post ideas that they generated for the task over a four-day period. The system provided each group its own electronic page and allowed group members to contribute comments to the page simultaneously. All contributions appeared on the page in the order they were contributed and were immediately readable by all group members. Contributions were anonymous. Students could log in the system and input ideas anytime and anywhere they had Internet access.

Before participants started the task, one class period for each participating class was used for training. The instructor introduced group decision making process and computer supported ideation, demonstrated how to use GSS to post ideas. Then students engaged in hands on experience by generating ideas about a practice task. Toward the end of the class, the instructor distributed hard copies of the experiment task, and announced the date and time to start the task. A soft copy of the task description was also available online. The instructor told the participants that the assignment was a group assignment, each one of them would work with several other students to complete the task, and the grade would be assigned at a group level, and the assignment grade is worth 5% of their final grade. The instructor obtained students’ consent of participation. Participants who missed the training had an opportunity to make an appointment with the instructor to attend one of the additional training sessions. After the training class, each participant received an email including his/her login information (URL, login name, and password), and starting and ending date and time for the task.

3.4 Description of Experiment Conditions

The experiment has three conditions. In condition 1, when a participant logged in the system, he/she would see the following sentence as the instruction to do the task “Brainstorm ideas that could improve public school education (from kindergarten to grade 12) in the United States of America” and additional instructions about what kind of solutions they should generate “When you generate ideas, please generate ideas that can alleviate or solve the problem(s), and that could be implemented inexpensively, or easily, or quickly.” Later on we will refer this condition as Control.

In condition 2, in addition to the above instructions, participants would also see two ideas entered by an imaginary group member when they first logged in to

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\(^1\) We used Categorizer tool in the GroupSystems Thinktank product.
the system. Later on we refer to this condition as “Two Ideas”. In condition 3, the set up was the same as in condition 2, except that a participant would see ten instead of two ideas entered by an imaginary group member. We refer this as “Ten Ideas” condition. One of the authors of this paper acted as the “imaginary group member” and put two more ideas in Two Ideas condition, ten more ideas in Ten Ideas conditions in each of the following two consecutive midnights. As a result, there were six seeded ideas in Two Ideas condition, and thirty seeded ideas in Ten Ideas condition. The six seeded ideas are the same for all groups in Two Ideas condition, and the thirty seeded ideas are the same for all groups in Ten Ideas conditions.

In Control condition, since there was no imaginary group member to enter any ideas, the participant virtually worked by himself/herself for the group assignment. Since participants were told that they had several group members, if a participant saw no contribution from any of his/her team members, he/she probably perceived that his/her group members were not active. The experiment conditions are listed in Table 1.

### Table 1. Study Conditions

<table>
<thead>
<tr>
<th>Condition</th>
<th>Set up</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control (No seeded ideas)</td>
<td>Brainstorm ideas that could improve public school education (from kindergarten to grade 12) in the United States of America. ADDITIONAL INSTRUCTIONS - When you generate ideas, please generate ideas that can alleviate or solve the problem(s), and that could be implemented inexpensively, or easily, or quickly.</td>
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<tr>
<td>Two ideas (Two seeded ideas each day)</td>
<td>The same instruction as in the Control condition and two concrete ideas of how to solve the problem when first log in. Two more ideas were seeded in each of the two consecutive nights. There were 6 seeded ideas altogether.</td>
</tr>
<tr>
<td>Ten ideas (Ten seeded ideas each day)</td>
<td>The same instruction as in the Control condition and ten concrete ideas of how to solve the problem when first log in. Ten more ideas were seeded in each of the two consecutive nights. There were 30 seeded ideas altogether.</td>
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### 3.5 Outcome Measures

#### 3.5.1 Number of solutions

The major outcome measure is the number of solutions. Every message posted by a participant is regarded as a posting. However, not every posting contains solutions. A solution is a verb + objective combination that consists of an idea that could ease or solve the problems faced by the public school K-12 in the United States. A posting could contain zero to many solutions. When a posting contains many solutions, we adopted a disaggregation approach to count solutions. This approach has been shown to yield high inter-rater reliability [21]. For example, the sentence “advertise in newspaper, TV, and magazine” contains four solutions, and it would be disaggregated to: “advertise”, “advertise in newspaper”, “advertise in TV”, and “advertise in magazine”. Sometimes, a noun or noun phrase could also be counted as a solution. For example, the phrase “smaller class” is considered a solution and could be rephrased as a verb + objective combination, such as “reduce class size”.

#### 3.5.2 Elaboration coefficients

Another measure that we adopted to evaluate the solutions is elaboration coefficients. According to Vreede and his colleagues, “Measures of brainstorming productivity must take into account more than just the number of solutions a group produces. Elaborations are also an important part of the value a group contributes. An elaboration is a task relevant reference to a previously submitted unique idea. So, e.g., a comment ‘Say, that could really work given our excess capacity!’ to a previous unique idea, can be counted as an elaboration. As people elaborate on ideas, the ideas accrete meaning and significance among the group members. As meaning and significance increases, the usefulness and value of an idea may rise. Even an elaboration as simple as, ‘I agree,’ adds meaning: not only does this idea exist, but it has support within the group. Elaborations may attach consequences and implications to the awareness of an idea.” [27]

We will calculate the elaboration coefficients for three conditions. The formula for calculation will be explained in the result section.

### 4. Results

Not all participants posted ideas on the system. There were 23, 27, and 28 participants posted ideas in Control, Two Ideas, and Ten Ideas groups respectively. Some of these participants did not fill out the surveys. There were 22, 27, and 26 filled-out surveys in the
corresponding groups listed above. All survey items have 7-likert scale, with 1 indicating strongly disagree and 7 indicating strongly agree.

4.1 Manipulation Check

There were two questions for manipulation check. The first question was “The interactions with other group members for the task made me feel we work as a group.” The second question was “In general, my team members are working hard for the group task.”

<table>
<thead>
<tr>
<th>Table 2. Means of Manipulation check</th>
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<tbody>
<tr>
<td>Condition</td>
</tr>
<tr>
<td>Control</td>
</tr>
<tr>
<td>Two Ideas</td>
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<tr>
<td>Ten Ideas</td>
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<tr>
<td>Total</td>
</tr>
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</table>

An ANOVA test indicated that there was significant difference among the three conditions for both manipulation check questions. For manipulation check question 1 (F=7.11, p=0.001), the post hoc Bonferroni indicated that one comparison was significant: Control and Ten Ideas (p = 0.001) and one comparison was approaching significant: Control and Two Ideas (p = 0.10). The comparison between Two Ideas and Ten Ideas was not significant (p = 0.17). For manipulation check question 2 (F = 11.96, p<0.001), the post hoc Bonferroni indicated that all three comparisons were significant: Control and Two Ideas (p = 0.035), Two Ideas and Ten Ideas (p = 0.039), and Control and Ten Ideas (p < 0.001).

The participants’ response to both manipulation questions indicated that the manipulation was a success to a large degree. Since there were seeded ideas in Two Ideas and Ten Ideas conditions, participants in these conditions should have felt they worked as a group.

4.2 Evaluation of Solutions

Two research assistants (RAs), who were blind to experiment conditions, extracted solutions from postings in all three conditions. The seeded ideas in Two Ideas and Ten Ideas conditions were excluded from the data analysis. The solution extraction consisted of three steps. Step 1 was training. One of the authors trained the RAs to do the extraction by showing examples, and asked them to extract solutions from several postings independently. Then the author demonstrated the correct extraction and reemphasized the correct extraction method. Step 2 was extracting solutions. Both research assistants used an Excel file to store the extracted solutions from each posting independently. Step 3 was resolving disagreements. The author compared all the extractions to identify those that did not match with each other, and asked the RAs to discuss FtF and come up an agreed extraction for each disagreement. After the RAs have resolved their disagreements, the author counted the number of solutions for each posting, and then calculated the number of solutions for each group in every condition. Table 3 and figure 3 show the average number of solutions for each condition.

<table>
<thead>
<tr>
<th>Table 3. Means of Number of Solutions</th>
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<tbody>
<tr>
<td>Condition</td>
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<tr>
<td>Control</td>
</tr>
<tr>
<td>Two Ideas</td>
</tr>
<tr>
<td>Ten Ideas</td>
</tr>
<tr>
<td>Total</td>
</tr>
</tbody>
</table>

As Figure 3 illustrates, group members, who perceived that their co-workers did not contribute, in other words, there was no opportunity for social loafing (Condition 1, Control), generated a greater number of ideas than those who perceived that there was opportunity for social loafing but their co-workers contributed little (Condition 2, Two Ideas) (Mean = 7.21 vs. Mean = 5.85). However, the difference was not significant (F= 1.72, p = 0.20). H1 did not receive support in terms of number of solutions.

When there was opportunity for social loafing, group members who perceived that other group
members contributed a large number of ideas (Condition 3, Ten Ideas) generated a greater number of ideas than those who perceived that other group members contributed a small number of ideas (Condition 2, Two Ideas) (Mean = 7.11 vs. Mean = 5.85). However, the difference was not significant (F = 1.36, p = 0.26). Therefore, H2 did not receive support in terms of number of solutions.

H3 predicts that group members who perceive their co-workers contribute a lot (Condition 3: Ten Ideas) will perform better than group members who perceive that their co-workers do not contribute (Condition 1, Control). The statistical analysis showed that there was no difference between the number of solutions generated in these two conditions (Mean = 7.21 vs Mean = 7.11; F = 0.006, p = 0.94). H3 did not receive support in terms of number of solutions.

Despite the insignificant difference of statistical analyses of the number of solutions, another measure, elaboration coefficients, did reveal the difference of ideas among three groups. We calculated the measure by using the formula proposed by Vreede and his colleagues [27].

"Elaboration Coefficient $\epsilon = \delta / ((N-1) - \tau - \rho)$, where:

- $\delta$ means the total number of contributions that refer to previously proposed ideas.
- $N$ means total number of contributions, consisting of task-relevant ideas, task-relevant elaborations, redundancies, and noise.
- $\tau$ means non-task relevant contributions, i.e. noise.
- $\rho$ means task relevant redundancy, e.g. the same original idea being contributed again.

The term, (N-1) in the denominator removes the first contribution from the calculation. This contribution by definition cannot be an elaboration. Thus, the Elaboration Coefficient contrasts the actual number of elaborations (numerator) with the maximum possible number of elaborations excluding noise and redundancy (denominator). Epsilon may assume a value ranging from 0.0 to 1.0. An epsilon of 0.0 means that no contributions elaborated on previous contributions, each was a new thought. An epsilon of 1.0 means that every contribution after the first was an elaboration on the first. "[27]

The elaboration coefficients were 0.13, 0.50, and 0.57 for Control, Two Ideas, and Ten Ideas respectively. Control groups did not produce many elaborations, which makes sense, a person normally will not comment on her own ideas, whereas the other two groups produced much more elaborations. The results demonstrated that even though there was no significant difference among the number of solutions generated in different conditions, the richness of the ideas varied greatly. Both Two Ideas and Ten Ideas groups produced a lot more elaborations, some of which were solutions, and some of which were not. However, all elaborations enriched the meanings of the ideas generated, as the elaborations showed several things: the team member agreed or disagreed with an idea, the team member asked clarification of an idea, the team member thought an idea was practical or impractical, or how an idea should be implemented.

In summary, according to elaboration coefficients, group members in Two Ideas and Ten Ideas performed better than group members in Control, and it seemed that there was no big difference between Two Ideas and Ten Ideas. This conclusion supports H3, and failed to support H1 or H2.

Even though only H3 received partial support, the data on the number of solutions revealed a very interesting pattern of the effects of social loafing and social comparison. If only social loafing effect existed, then the average number of solutions for each condition, from the largest to the smallest, should be Control, Two Ideas, and Ten Ideas, since the possibilities for social loafing was ranked from no possibility, low possibility, to high possibility for these three conditions respectively. On the other hand, if only social comparison effect existed, then the average number of solutions for each condition, from the largest to the smallest, should be Ten Ideas, Two Ideas, and Control, since the perceived effort made by co-workers should be ranked high effort, low effort, and no effort.

The pattern of the data indicated that the effects of social loafing and social comparison co-existed. However, the insignificance of the statistical analyses does not allow us to claim that one effect is stronger than the other for a certain situation.

5. Discussion

Previous studies of anonymous ideation usually focused on the effects of evaluation apprehension and social loafing caused by anonymity in FtF interactions. These studies indicated that anonymity usually provides more group process gains (reducing evaluation apprehension) than group process loss (providing an opportunity for social loafing) in FtF interactions. Therefore, anonymity has positive effect on group performance in FtF interactions. However, this result should not be generalized to asynchronous interactions without further investigation.

We proposed that a third effect - social comparison – should be considered when investigating anonymity on group performance in asynchronous interactions.
We plan to investigate the effect of anonymity on group performance in asynchronous interactions in two studies. This paper reports the first study, which investigated group performance in anonymous asynchronous ideation when there were different possibilities for social loafing and different levels for social comparison.

Our research results indicate that the effects of social loafing and social comparison co-exist. We speculate that in different group interactions, participants may have chosen different behaviors (social comparison vs. social loafing) to engage, however, their choices did not seem to exert significantly different influence on group performance in terms of number of solutions generated.

On the other hand, we cannot simply draw a conclusion that when evaluated by group outcomes, those groups where some members engage in social loafing will achieve similar performance as groups where all members participate. When group members participate, they could build upon others’ ideas, clarify ideas, and engage in more in-depth discussion of a particular idea, as indicated by Conditions of Two Ideas and Ten Ideas in our experiment. From this perspective, social loafing did exert a negative impact on group performance, and should be reduced or avoided.

6. Study Limitations

There might be three reasons or experiment design limitations that cause the data to fail to support the hypotheses. The major reason might be that the experiment task was not very relevant to the subjects. Therefore, the subjects might lack genuine interest in the experiment task. As a result, the experiment effect is not strong enough to display the differences as predicted.

Second, the manipulation of the co-worker’s input might not be strong enough. We told students that they would work with several other students in the group task. In fact, there was only one simulated co-worker. If the students were told that they had just one co-worker, their perception of their co-workers’ volume of input might have changed considerably. Ten ideas from three co-workers vs. ten ideas from a single co-worker would have been viewed differently by them, and the changed perception of their co-worker’s effort might have exerted stronger experiment effect.

Third, we only evaluated group performance in terms of number of solutions and elaboration coefficients. We have not evaluated the quality of these solutions, which may provide more insights into our understanding of how participants perform differently in different conditions.

Another limitation of our study is that we only measured the participants’ perception of social loafing using two questions. The first question was “The interactions with other group members for the task made me feel we work as a group.” The second question was “In general, my team members are working hard for the group task.” We should also include survey questions to measure the participants’ perceived level of social comparison so that we could compare which effect might be stronger in a particular condition. By doing that, we would be able to illustrate which behaviors the participants have actually chosen to engage, which would further our understanding of how these effects work together with or against each other.

7. Conclusion

Despite the limitations mentioned above, this study made a contribution to the existing research of group work in general, and of ideation in particular. However, the contribution lies more in the questions that it uncovers than in the answers that it provides. Future studies with more appropriate tasks, and more fine-grained design should be conducted to see 1) which effect, social loafing or social comparison, is stronger and under what conditions, and 2) how the effects of social loafing and social comparison could be minimized or maximized to increase group performance.

References


