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When Is Collaborating With Friends A Good Idea? Insights From Design Education

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Prior research is split on the relationship between prior friendship and performance. Based on our review of the literature, we highlight areas where further research is needed to achieve greater practical applicability of the results. We then present our study measures and preliminary analysis of data collected from a design studio university course. Our quantitative and qualitative probes suggest a link between teammates' prior friendship and lower performance outcomes. We also identify four group processes that may mediate the relationship between friendship and performance.

Introduction

This paper presents a study of how prior friendship in student groups influences learning and performance in computer-supported collaboration. We review earlier studies on friendship, highlight the dimensions in which our work differs, describe the context, data collection strategies for assessing the impact of students' friendships, and present preliminary statistical analyses. The results show a significant, large negative correlation between prior friendship and performance. We bring together quantitative and qualitative methodologies to understand the ways in which the relationship between project quality and pre-existing friendship among teammates plays out in design project collaborations. We conclude by describing the next steps to evaluate the causal direction of this relationship, and suggest that collaboration in teams where some teammates are friends and others are not (i.e., mixed-friendship groups), may be the worst possible combination of friends and non-friends in project teams.

Our data is drawn from a design and implementation project, completed by thirty-nine university students working together in teams as a part of their coursework for six weeks. The need for understanding the relationship between collaborative processes, practices, behaviors, and successful outcomes is particularly salient in this domain because design problems lack true-or-false solutions. Instead, they feature better-or-worse comparisons among potential, interdependent solutions (Cross, 1984). We are especially interested in the effect of *prior* friendship relationships between teammates rather than on the friendships that develop through the collaboration, although we evaluate both. Prior friendship can be ascertained before the project begins, and guide group composition. Other characteristics and factors of groups that impact performance – such as the development of friendship among teammates — occur through the interactions among group members, are susceptible to context and circumstances, and are therefore harder to predict.

Prior Research On Collaboration Among Friends

Researchers remain split about the relationship between group members' friendship and outcomes, and the prior published work on friendship among students has left important areas in need of inquiry. First, consider the research that highlights the benefits of friendship in collaborative task performance. Newcomb and Bagwell (1995) found friendship collaborations to have more intense social activity, more frequent conflict resolution, more effective task performance, and to be marked by reciprocal and intimates properties of affiliation, greater equality, mutual liking, closeness, and loyalty. Theorists have also suggested that the psychological context of friends collaborating may be associated with productivity and learning gains (Azmitia, 1996; Shah & Jehn, 1993), as well as social and emotional growth (Newcomb & Bagwell, 1995). The ease of establishing a shared problem-solving space in groups of friends has also been linked to successful outcomes (Barron, 2003; Brown, Collins, & Duguid, 1989), arguably from the group members' familiarity with the prior knowledge, communicative strategies, and thinking styles of their partners.

Others believe that working with friends yields lower-quality outcomes because friends have more off-task, disruptive behavior, stronger pressures to agree, and reluctance to be critical of each others' ideas (Dutson, Todd, Magleby, & Sorensen, 1997; Zajac & Hartup, 1997). Prior work found that groups of friends both disagree more frequently (Shah and Jehn, 1993) and are more concerned with resolving disagreements (Newcomb & Bagwell, 1995) than those composed of non-friends. That is, people find it easier to disagree with friends on topics of low importance (such as whether the referee was unfair) and discuss

the topic until agreement is reached. Yet it is harder to critique friends' important decisions (*e.g.*, "I don't think you should buy that house/date this person") even when the outcome would be better had these concerns been expressed. Even when debate is vital for a successful outcome, dense social network ties among members can "bind individual team members into mutual consensus and lack of disagreement" (Balkundi & Harrison, 2006), leading to poor performance while simultaneously creating perceptions of high affiliation and agreement among teammates (Janis, 1982; Strough, Swenson, & Cheng, 2001).

Prior research is limited in key respects if we wish to understand the relationships between the friendship makeup of groups and their work products over the significant periods of time commonly associated with authentic teamwork. Research has not reflected the heterogeneity of friendships common to educational environments, where a combination of friends, acquaintances, and others – whether strangers or disliked colleagues – work together. Instead, the groups previously studied are homogeneous with respect to friendship, comprised of all friends or all non-friends, with reciprocal assessments of the relationship. Most prior work compared "friend" and "non-friend" dyads by pairing participants with either preidentified friends or with other participants (*e.g.,* Miell & MacDonald, 2000). On this binary view, non-friend dyads include both pairs that do not know each other and pairs that do not like each other. By aggregating these two distinct cases, it has been suggested that the "friend" condition fares more favorably than if it were compared simply against pairs who did not know each other (Strough, Berg, & Meegan, 2001). An additional factor to consider is that pairs may not rate each other symmetrically. This heterogeneity becomes especially important when studying groups larger than dyads.

As Strough, Swenson, and Cheng (2001) point out, few studies address whether the *products* friends create together are superior to those of non-friends, or examine friendship and collaboration over multiple sessions. The study presented in this paper is longer in duration (six weeks) and comprises more meetings (3-4 times/week) than prior work in this area. This is important because the effects of social ties between teammates have been shown to diminish as team tenure increases (Balkundi & Harrison, 2006). Therefore, it may be that the previously reported positive effects of friendship upon team performance are limited to initial contact.

Most collaboration research studies investigate same-gender dyadic interactions in a controlled environment during one or a small number of sessions. Few studies consider performance achievements in mixed gender groups, or for teams of 3 and 4 students (Shah & Jehn, 1993; Zajac & Hartup, 1997). And one review highlights how investigations of contrived laboratory tasks (such as Azmitia & Montgomery, 1993; Shah & Jehn, 1993) outnumber those of classroom contexts (*e.g.*, Strough, *et al*., 2001b). One important way in which classroom collaborations differ significantly from laboratory studies is that the effects of the group's work impact all the teammates' performance beyond the timeframe of the study (Azmitia, 1996) – which may alter the observed importance placed on preserving the social relationship over outcome during decision making.

Method

The context for our research is design education, specifically a design studio course at Stanford University. We studied the course's final project, which accounts for a quarter of the students' course grade, and because of its reliance on computer-supported collaborative project work. The final project emphasizes iterative design and testing of a functioning interactive system. These student projects included an automatic lighting system for homes, an interactive teddy bear for hospitalized children, and a video conferencing system for mobile phones. It has been suggested that differences between friends and non-friends' collaboration are most apparent on challenging tasks, such as these (Azmitia & Montgomery, 1993). Achieving success at these projects requires both individual and group work. Students form groups and select topics themselves. As we did not seek to alter or influence students' preferences in group formation, the groups we studied were heterogeneous with respect to friendship and were often mixed-gender. Rather than focus on dyads solving a laboratory task, this study examined 3- to 4-person groups as they formulated, conducted, and completed a complex, creative, open-ended project.

All 41 students enrolled in the design studio course in 2007 were invited to participate in the study; of these, 39 (13 female, 26 male) agreed. Participating students were provided with the study's consent form and a pre-experience questionnaire. At the last class meeting, after the project presentations, students were asked to fill in a post-experience questionnaire without knowing their course grades or the evaluation of their projects. Using relevant items developed in previous research (Bailenson & Yee, 2006; Hinds & Mortensen, 2005; Mercier & Barron, 2003), the questionnaires measured attitudinal, self-reportedbehaviors, and experiences within the groups (Maldonado, Lee, Klemmer, & Pea, 2007).

Table 1. Correlation and Descriptive Statistics for Group Friendship and Project Performance.

Variable	Group friendship	Project Performance
Group friendship		-0.61**
Mean	0.437	30.98
SD	0.376	2.06
Min	0.00	26.4
Max	1.20	33.5

* $p < 0.05$, ** $p < 0.01$

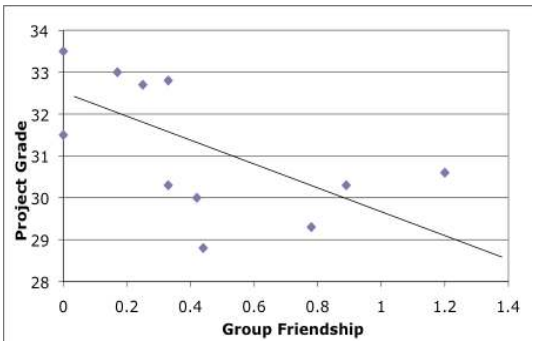

Figure 1: Scatterplot showing negative correlation between Group Friendship scores (X-axis) and Project Performance (Y-axis)

Participants were predominantly engineering students, with the majority pursuing degrees in Computer Science and related disciplines; 44% were undergraduate students (juniors and seniors) and 56% were enrolled in graduate programs. Participants volunteered their time at filling out the survey instruments; no remuneration was offered. The data were not visible to any course staff until after course completion, when solely aggregate and anonymized data were presented.

We asked students to rate their relationships to each of their teammates at the end of the class, as friendship nominations elicited before group formation may be influenced by perceived competency and achievements of their peers (Strough *et al.,* 2001a). Students choose between the categories: "friend," "acquaintance," and "non-friend". This last option of "non-friend" represents the situation when students did not previously know each other. (As we did not expect students to choose to work with people that they did not get along with, we did not include a friendship category for teammates actively disliked prior to the project). We calculated a *group friendship score* for each team by averaging teammates' individual friendship ratings. For example, each person on a four-person team rated their three partners, so the group friendship score represents the average of these twelve ratings. This approach of using averaging to create one measurement per group follows Balkundi & Harrison (2006).

Team project performance was measured by project grade, calculated from assessments from the course staff (two instructors and two teaching assistants) and a panel of independent judges. After grades were distributed and the course had ended, students were invited to volunteer for interviews to discuss their technology usage and group dynamics in the course.

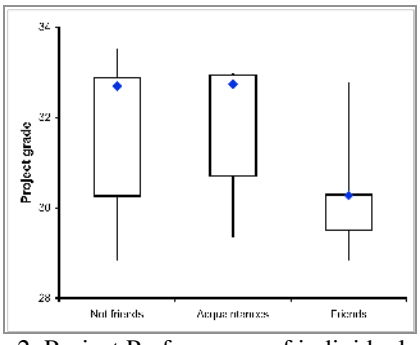

Figure 2. Project Performance of individuals who were friends with at least one teammate was lower than that of individuals who had no friends on the team.

Results

The unit of analysis for all results is the group. There was a large and significant negative correlation between the team's aggregate pre-existing friendship rating and their project grades (Pearson $r = -0.61$, $p < 0.01$; see Table 1 and Figure 1). Ten individuals—in five matching pairs—reported working with pre-existing friends; each pair was in a different group. Figure 2 plots, for each student, project grade against the level of friendship with their closest teammate. It shows that students who had a friend on their team performed worse than those that did not. None of the items in the questionnaire regarding self-evaluation of positive team dynamics (whether the group "had fun together," "got along well," "liked your teammates") was significantly correlated with the prior friendship of group members.

Discussion

Qualitative data drawn from the interviews conducted after the course supports the negative correlation between prior friendship and group performance. When asked how working with friends may help or hinder the groups during the interviews, one student remarked on the adage "do not mix business and pleasure: don't work with family or friends" for a good outcome. Three other students suggested that they preferred working with friends and explained their reasons, such as "he knows when my parents are in town, or that it's my girlfriend's birthday, and understands that's why I am late to meetings, or forgot to email my part." The students' statements suggest that teammates may partner with friends because of the slack it allows them. Conversely, when working with strangers students may feel the need to establish a reputation that they take for granted when working with friends. In either case, the students' comments imply that their contributions to the team are of lower quality when collaborating with friends.

We hypothesize friendship affects group performance in three places: team formation, group meetings, and project execution. In the former situation students may choose to partner with friends, rather than with the most talented students. Students may partner with friends because they are *loss averse* (Kahneman & Tversky, 1979): friends represent a known quantity, preferable to potentially nightmarish group mates. During meetings the pressure to agree (Newcomb & Bagwell, 1995), reluctancy to be critical of friends' work (Dutson, *et al*., 1997), and supportive emotional environment (Azmitia, 1996; Hartup, 1996), may guide teams of friends towards lower quality or less well-developed project ideas. When comparing the dynamics of groups of friends versus those composed of non-friends, friends tend to have a positive orientation towards each other's ideas, and are reluctant to criticize each other, especially in front of others (Dutson, *et al*., 1997).

Lastly, asymmetrical friendship levels within a group may impede the creation of a coherent, unified group identity. Teams with only *some* prior friends may be particularly prone to incur the above-mentioned quality costs of working with friends without realizing the quality gains, leading to the breakdown we see in Figure 2. All the groups we studied contained varying friendship strengths; no group was composed exclusively of friends. This is generally representative of real-world groups. However, it is possible that all-friends groups perform differently. This remains a topic for future study.

Conclusion and Next Steps

Prior research has been split on when the relationship between friendship and group performance is a positive or negative one. Our study analyzed the products and prior friendships of mixed-gender, heterogeneous friendship groups of three and four students solving complex, open-ended problems over a six week period. By studying classroom collaborations in the classroom rather than in the laboratory, we sought to provide advice of greater application relevance to educators and collaborative software designers. The contribution to the CSCL literature of this paper is that in these "real-world" conditions, we found a strong negative correlation between prior friendship and project performance, raising concerns about friendship-matched grouping. These findings provide empirical support for theoretical work (*e.g.,* Azmitia, 1996) that posits that friendship makes a difference in the psychological context of collaboration. Several important questions remain. For example, how does the subjective satisfaction of friend groups compare to non-friend groups? Additionally, it would be valuable to compare friendship and performance in contexts beyond design education.

Prior research has often conflated group cohesiveness, skill complementarity, and friendship when linking to performance outcomes (Shah & Jehn, 1993). To determine the conditions under which it is advantageous or not to work with friends, we will be measuring and analyzing these three constructs separately. Separating them might explain some of the apparent differences in prior results.

An understanding of how group dynamics impact performance can suggest specific areas where the groups' experiences might be supported through novel designs of collaborative technologies and pedagogical practices. For instance, one could try to mitigate social pressures to agree by introducing secret–ballot voting, using anonymous chat for decision-making meetings, and/or formalizing a practice of critiquing group deliverables.

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