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NONE OF US IS AS LAZY AS ALL OF US

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Coye Cheshire & Judd Antin

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Social intelligence and loafing in information pools

In this paper we apply theory and research from sociology and social psychology to the problem of collective information sharing and exchange on the internet. We investigate the relationships between pre-existing dispositions to be cautious towards others, the propensity to exert more or less effort as a function of group affiliation, and contribution towards a collective goal. We find that individuals with average or lower levels of general caution are more likely to contribute to a collective pool of information, providing support for Yamagishi's (2001) argument that less cautious individuals exhibit a type of social intelligence by engaging in risky but potentially rewarding social interactions. Consistent with the literature on social loafing, we find that abstract group affiliations have a negative effect on information sharing behaviour. However, the effect of group affiliation is mediated by one's level of general caution. We argue that pre-dispositions to engage in socially risky situations are a critical element of individuals' decisions to contribute to online information sharing systems or not.

Keywords sociology; Web 2.0; ICTs; communication studies; computer-mediated communication

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Introduction

Advances in interactive web technologies, combined with widespread broadband adoption, have made collaborative information sharing ubiquitous. Millions of individuals work together to aggregate, annotate, and share digital text, audio, images, and video. The efforts of many combine to create shared bodies of information that achieve value above and beyond their constituent parts. While the potential value of shared information resources is significant, the reliance on individual decisions to contribute time, effort, and information

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can lead to failure. Online information systems constantly face the problem of motivating users to contribute to the collective resource instead of free riding on the efforts of others.

Prior theory and research on the motivations that influence contributions to online information systems focus on economic costs and benefits (Shapiro & Varian 1999; Kollock 1999), social psychological incentives (Ling *et al.* 2005; Lakhani & Wolf 2005; Cheshire 2007; Cheshire & Antin 2008; Rafaeli & Ariel 2008), and the constraints of system design (Rafaeli *et al.* 2007; Cheshire & Antin 2009). Less frequently studied are the effects of pre-existing dispositions to undertake or avoid socially risky situations. This is surprising, given that tendencies to accept or avoid social risks underlie all collective action problems, and all systems of sharing online information are collective action problems (Kollock 1999).

Another important motivator for contributors of information in online settings is group membership. Much of the research in this area focuses on the benefits of acting as a leader (Kraut *et al.* 2007), perceiving oneself as part of a community (Fulk *et al.* 1996), or building and maintaining social ties (Baym 1999). Positive group effects are often viewed as solutions to the *social loafing* problem. Social loafing is defined as the tendency for individuals to exert more individual effort alone than in groups (Latané *et al.* 1979). In information sharing, social loafing refers to situations in which individuals contribute less information when they are part of a group than they do individually (Ling *et al.* 2005). Social loafing has usually been treated as a general phenomenon that equally influences all participants in a collective task. However, we argue that social loafing is a compound problem, disproportionately affecting those who are explicitly affiliated with groups within the larger collective effort.

In this paper, we draw on theory and research from sociology and social psychology and apply it to the problem of individual under-contribution in collective information sharing and exchange. We investigate the effects of two independent factors on contribution behaviour: (1) caution towards others as a disposition to accept or reject social risks and (2) the propensity to exert more or less effort towards a collective effort as a function of an arbitrary group affiliation. Group affiliations and pre-existing dispositions to accept social risks are significant components of human motivation that, in conjunction with economic, social psychological, and situational factors, can provide a more comprehensive view of information sharing behaviour.

Overcoming the free-rider problem: motivations for contributing information online

When information from many different sources is collectively transmitted over a computer network so that it can be accessed for public, club, or private

consumption, it creates an *information pool* (Cheshire & Antin 2008). The digital information goods in these systems may include text, software, photographs, audio, and video (Kollock 1999; Cheshire 2007). Examples of information pools include collaborative content systems in which individuals contribute and collectively edit, organize, and manage content (e.g. Wikipedia), peer-to-peer file-sharing systems in which individuals exchange music, movies, and software (e.g. BitTorrent), social voting and filtering systems (e.g. Digg), and distributed work systems in which individuals contribute small quantities of information to help complete large tasks (e.g. Project Gutenberg Distributed Proofreaders).

As is the case in public good problems, individuals who participate in information pools must overcome the temptation to consume the public good without contributing to it. If everyone followed this strategy of free-riding on the efforts of others, the public good would not be produced. In fact, the benefits that an individual expects to receive as others collect from the public good change the likelihood of contribution (Marwell & Oliver 1993). Olson (1965) originally predicted that larger groups would have a more difficult time producing public goods than smaller groups because large groups have higher coordination costs and less efficient communication. However, group size can actually have the opposite effect under the right conditions. For example, if the number of individuals in a given network is large enough, then it can dramatically change the potential for success because it becomes progressively more likely that altruistic actors will be present and contribute to the public good as group size increases (Oliver & Marwell 1988). Furthermore, if many individuals can benefit from a public good without impeding anyone else's enjoyment, then larger groups are more likely to produce a public good than smaller ones (Marwell & Oliver 1993). This property is called high jointness of supply (Kollock 1999; Cheshire 2007) or non-rivalry (Shapiro & Varian 1999).

The unique combination of high potential value and low cost of contribution distinguishes online information exchange from most other forms of material exchange. Of course, there is always some low costs associated with contributing to a public good with high jointness of supply, even if it is just the opportunity cost of time that could have been spent elsewhere (Heckathorn 1996). However, when the cost of contributing information is very low, relatively small inducements can have a powerful effect on overall contribution behaviour (Cheshire 2007). When these small inducements are provided only to those who contribute to the public good, they act as selective incentives. Selective incentives provide an important solution to the free-rider problem because they make cooperation rational even when the social dilemma in collective action makes cooperation irrational (Oliver 1980; Heckathorn 1996).

Ling *et al.* (2005) investigate the contribution behaviour of individuals who provide information to a movie rating and recommendation system called MovieLens. In one experiment, the researchers use email reminders to encourage

participants to view their contributions as unique. Drawing on Karau and Williams' (1993) collective effort model, Ling *et al.* argue that individuals will contribute more to a collective good that they personally value and when their own contributions are known to be valuable to others. Ling *et al.* (2005) find that promoting uniqueness significantly increases contribution rates, demonstrating the relatively powerful social psychological effects that come from knowing one's own impact and value to others in a group.

Rafaeli and colleagues examine various economic and social incentives in information pools such as bulletin boards (Rafaeli & LaRose 1993), Google Answers (Rafaeli *et al.* 2005), and a computer-simulated information trading system (Rafaeli & Raban 2003). A key finding of this research is that feeding information about group and communicative behaviour back to the user through judicious design decisions can increase contribution behaviours (Rafaeli *et al.* 2005) and the subjective value of information for the users (Rafaeli & Raban 2003). In a review of several different information sharing studies, Rafaeli and Raban (2005) synthesize and compare findings to create a list of factors that promote online information sharing (e.g. reciprocity, designation as a community leader, and common goals) or hinder it (e.g. hierarchical organizational structures, selfishness, and lack of self-efficacy).

Cheshire and Antin (2008) examine the effect of different forms of synchronous feedback on repeat contributions to an information pool called Mycroft. Immediately following an individual's first contribution of a small text transcription task, the contributor received no feedback (a control condition), a message of gratitude, a relative ranking, or a reminder of past contributions. The researchers find that individuals contribute more information – up to twice as much – when they receive any of the three types of feedback compared to the control condition. In a different set of field experiments, Cheshire and Antin (2009) show that relatively small changes in the visual presentation of the tasks significantly affect contribution behaviours. However, these changes are effective only when there is already some level of intrinsic motivation to participate or to be part of a collective effort.

Together, the research reviewed above shows that social, economic, and interface design factors are essential for understanding motivations to contribute information online. Despite all that we know about incentives and motivations to share information, what is missing is an empirical investigation of pre-existing tendencies to avoid or engage in socially risky interactions and to exert more or less effort based on group affiliations within a larger collective. We argue that pre-existing dispositions and the tendency to form and associate with groups within larger collectives are salient factors in *all* current forms of collective information sharing (e.g. Wikis, blogs, and question/answer services). If we ignore these two factors, we risk misinterpreting the influence of incentives and situational factors without understanding the salient differences between individuals before they make a choice about participation.

Theory and hypotheses: social intelligence and social loafing

Yamagishi (2001) refers to an individual's capacity to identify risky interactions with others and to distinguish between those who are trustworthy and those who are not as a type of social intelligence. Intelligence is a broad concept that is often divided into many different dimensions, including spatial, logical-mathematical, linguistic, musical, and personal, among others (Gardner 1983). However, *social intelligence* is specific to interpersonal awareness and comprehension, defined as one's skill, 'in understanding their own and other people's internal states and use[ing] that understanding in social relations' (Yamagishi *et al.* 1999, p. 155). Using post-experimental questionnaire surveys, Yamagishi (2001) found that a majority of individuals believe that those who are generally more cautious and distrustful of others tend to be 'smarter, less gullible, more successful' than those who are generally less cautious and more trusting of others (p. 121). However, as sociologists and social psychologists have long argued, beliefs about behaviour are rarely consistent with observed behaviour. Yamagishi's (2001) experimental research demonstrates the exact opposite of what his survey respondents believed: individuals who are *less* cautious of others tend to be *more* perceptive in potentially risky and uncertain social interactions. As Cook *et al.* (2005) argue, 'Risk-taking based on their lower levels of cautiousness provides [less cautious individuals] with the opportunity for more profitable interactions over time' (p. 25).

Less cautious individuals are willing to engage in different types of social interactions (cf. Hardin 1992). Highly cautious individuals engage in less social interaction, and negative experiences in risky or uncertain situations bolster their existing beliefs about vigilance. Lower caution, then, constitutes a form of social intelligence that is akin to openness to experience or acceptance of risk when there is a potential for current or future gain. Furthermore, the acceptance of risk in social interaction can increase one's social capital or the diversity of resources that can be accessed through network ties (Portes 1998; Lin 2001). Low caution is often associated with higher general trust, facilitating social exchange and access to current or future resources.

Deciding whether or not to contribute to a collective pool of information is a risky and uncertain social choice. The decision is risky because there is a low cost of one's own time and effort to contribute information, while the potential benefits from the collection of information entirely depend on the efforts of others (Kollock 1999). In addition, online interactions do not always have a defined audience, making it difficult to assess how many individuals might benefit from one's contribution (Cheshire 2007). The situation is uncertain because individual contribution decisions are made at the same time without knowledge of what others might do. Following the logic of Yamagishi's (2001)

argument, less cautious individuals should be more willing to take social risks in an uncertain, but potentially rewarding, online environment. Thus, we expect individuals who are less cautious to contribute at a higher rate to a collective pool of information than those who are more cautious.

Hypothesis 1: Individuals with average or lower levels of general caution will contribute more than those with higher levels of general caution.

In all collective action problems, individuals are tempted to avoid contributing while benefiting from the effort of others (Olson 1965). In online information sharing, the social dilemma is analogous to situations in the offline world, apart from the relatively low costs associated with contributing information goods relative to physical goods (Kollock 1999). All participants in a collective effort face the same uncertain, risky situation, making one's perception of being an autonomous individual or a member of a cohesive group an important part of the decision-making process.

Prior research shows that individual effort actually decreases when individuals work in groups rather than as independent actors (Latané *et al.* 1979; Williams & Karau 1991). Latané *et al.* (1979) investigate the *social loafing effect* with several experiments that require individuals to exert the same type of effort either as an individual or as part of a group. The researchers consistently find that participants significantly exert more individual effort alone than in groups. The explanations for this effect include faulty attribution processes that are intended to maintain an equal division of labour and the tendency to redefine what it means to *maximize* one's own effort into something more akin to *optimizing* one's output to match the efforts of the group. Finally, Latané *et al.* (1979) propose a third explanation that individuals may perceive less contingency between their own effort and the collective output when they are performing as part of a group.

While social loafing has been observed in direct comparisons of individual with group efforts, a related but different issue is whether individuals will exert less effort in collective action problems when group membership is underscored in some way. In principle, every participant in an online system of information sharing is already part of a large group since rewards are contingent upon the contributions of others. Thus, all participants in these systems may decrease their own effort compared to what they might have done if they were solely responsible for the outcome. Decreased effort may seem contradictory to self-interest, since group practices and rituals are vital to obtaining and spreading social capital (Durkheim [1893] 1984). However, social capital in groups largely depends on trust that stems from enforceable obligations (Portes 1998). Thus, social capital may be less salient in loose group affiliations and collective efforts that do not allow for enforcement of norms, compared to tight-knit communities that allow for retribution.

Social loafing occurs not only when tasks are completed as a collective effort, but also when the affiliation with a group is *emphasized* to make it salient to the

participants. Following Latané *et al.*'s (1979) argument, an explicit group affiliation that is arbitrary to the task should enhance one's perception of being in a group without promoting other effects such as task competence, status, group values, or access to social capital. Since individuals are more likely to engage in social loafing when they complete tasks in distinctive groups, we expect individuals who are given an arbitrary group affiliation to contribute less than those who are not given a group affiliation. Of course, an arbitrary group that is unrelated to the task is only one kind of group that can exist within an online population. We return to this issue in the discussion and implications.

Hypothesis 2: Individuals who are assigned to an arbitrary group (unrelated to the task) will contribute less than those who are not assigned to a group.

Our third and final hypothesis concerns the interaction between levels of general caution and group affiliation. The tendency to contribute less (i.e. engage in social loafing) when group affiliation is emphasized should be stronger for those who are already likely to contribute. Based on Yamagishi's (2001) arguments about social intelligence, we expect less cautious individuals to contribute more than those with higher general caution (Hypothesis 1). Since we predict that those with higher levels of caution are less likely to contribute overall, the additional negative effect of group affiliation should be relatively slight. In fact, those who are more cautious to begin with are already more likely to be social loafers in a collective effort. In the interpretation of their experimental results, Latané *et al.* (1979) argue that 'Participants may have arrived with the preexisting notion that people often do not pull their own weight in groups. . .lack of trust and the propensity to attribute laziness or ineptitude to others could have led people to work less hard themselves' (p. 829). In comparison, individuals with average or lower levels of caution should be less likely to socially loaf in the overall collective task. Among these individuals, the additional effect of an explicit group affiliation should increase social loafing compared to those with no group affiliation. Thus, we expect the negative effect of group affiliation to disproportionately affect those with average or lower levels of general caution compared to those with higher caution.

Hypothesis 3: The negative effect of explicit group affiliation on contribution behaviour will be stronger for those with average or low levels of general caution compared to those with high levels of general caution.

Data and methods

To examine the effect of general caution and group affiliation on contribution behaviour, we conducted a two-condition experiment (group/no-group affiliation) with a single random factor (level of general caution). Several groups consisting

of 12–20 participants at a time made simultaneous decisions about contributing small amounts of information over a computer network. Participants were undergraduates at a large research university, recruited for the purpose of earning money. The average age was 19 and the gender distribution was 60 per cent female and 40 per cent male. The total valid *N* was 113 participants.[1]

General procedures

Participants signed up for experiment times in advance and were seated at isolated computer terminals upon arrival at the laboratory. They were told that they would make decisions on the computer, but they would not interact with other individuals or communicate with other participants in any way. The experiment consisted of four parts: instructions/practice, image preference task (for group or non-group assignment), text transcription task (the primary task of contributing information for collective benefit), and a final questionnaire.

Instructions. Participants were first given detailed instructions that explained that in this study, they would choose whether or not to complete text transcription tasks for the purpose of earning points, which would be translated into money at the conclusion of the study. Participants were told that they would make decisions without any feedback and would not know what other participants had done until the experiment was over. Points could only be earned when *other* participants completed text transcription tasks. Completing a transcription task cost −5 points to the contributor, and completed tasks submitted by others earned 10 points for everyone except the contributor.[2] Participants completed three practice tasks that had no impact on their earnings.

Image preference task. Once the instructions were complete, participants were given an image preference task. Following the research technique developed by Tajfel (1970), participants viewed two images at a time (paintings by Paul Klee and Vassily Kandinsky) and were asked to select the one they most prefer. After participants finished selecting images, individuals in the 'group assignment' condition were told that they were a member of Group D, based solely on their image preferences. This created a *minimal group*: a social arrangement based on ambiguous information, with no pre-existing status or social interpretation, which is immaterial to the primary task (Tajfel 1970).

Text transcription task. The primary experimental activity was the completion of text transcription tasks over many rounds. The layout and design of the tasks follow those employed in previous studies of online information pools (Cheshire & Antin 2008, 2009). Participants viewed pictures of scanned text and could choose to help transcribe the image by typing out the text on the screen or choose to not contribute anything and move on to the next transcription task

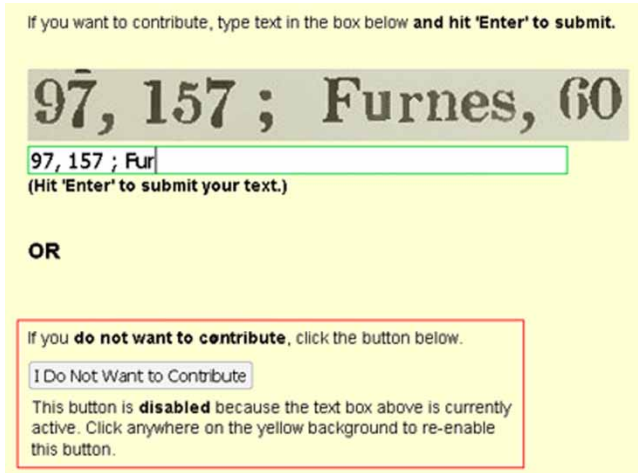

FIGURE 1 The text transcription task.

(Figure 1). Each participant received a total of 30 transcription tasks, but they did not know the number of tasks in advance to avoid end-game effects.

Final questionnaire. At the end of the experiment, participants completed a short questionnaire that included socio-demographic information and several attitudinal assessment scales. Participants were debriefed about the true nature and purpose of the study and were paid the maximum payment ($15) regardless of how much they actually chose to contribute.

Experimental conditions

The two conditions in the experiment were 'no group assignment' (control) and 'group assignment' (treatment). Assignment was random ($N = 53$ control and $N = 60$ group assignment). In the control condition, participants followed the procedures exactly as outlined above. In the group assignment condition, participants were told that they were assigned to a group, 'Group D', which was based on their choices in the image preference task. Participants were told that group assignment was a label based on preferences, but had no impact on earnings. During the text transcription task portion of the experiment, participants in the group assignment condition had a large visual reminder on the right side of the screen that said 'Group D' in bold text. Participants in both conditions were informed that their earnings depended on the contributions of *every* participant.

Manipulation check. The questionnaire at the end of the experiment included a manipulation check, which asked participants to recall the group to which they

were assigned (no group, Group A, Group B, Group C, or Group D). Only two participants incorrectly answered this question and were eliminated from the analysis.

Measuring general caution

The questionnaire at the end of the experiment included five questions from Yamagishi's general caution scale, measuring one's pre-existing disposition to be cautious towards other people (Yamagishi & Yamagishi 1994). The measure is context-independent and includes questions such as 'You cannot be too cautions in dealing with others' and 'If you are not careful enough, people will take advantage of you'. The items use a 7-point Likert-style scale ranging from strongly disagree to strongly agree.[3] The composite scale is computed as the average of the five responses. Higher values indicate an increased level of caution when dealing with others.

The average level of general caution in the sample was 4.5, with a standard deviation of 0.87. Since we are interested in relative differences between participants, we coded scores 'average or lower caution' at or below the mean and 'higher caution' for scores above the mean.[4] As Table 1 shows, the average level of general caution was approximately identical between the group assignment (4.53) and the non-group assignment (4.45) conditions. The distribution of participants with low/high caution was not significantly different between conditions ($\chi^2 = 1.6$, $p = 0.24$). This indicates that random assignment was successful and that individuals with high or low levels of caution were not disproportionally assigned to any single condition.

Dependent variable: contribution rate

The dependent variable is the rate of contribution behaviour over time. Since the decision to complete a transcription task or not was a series of 30 binary decisions, contribution rates were calculated for six equal trial blocks (the average of five contribution opportunities). The average contribution rate for the entire sample was 0.48, with a standard deviation of 0.34 (Table 1).

TABLE 1 Means and standard deviations for general caution and contribution rate by experimental condition.

experiment condition	*general caution*	*contribution rate*	N
Group affiliation	4.53 (0.95)	0.43 (0.34)	60
No group affiliation	4.45 (0.78)	0.53 (0.32)	53
Full sample	4.50 (0.87)	0.48 (0.34)	113

Standard deviations in parentheses.

Results

Our three hypotheses make predictions about the effects of general caution and group affiliation on contributions to a collective outcome. The first two hypotheses focus on the direct, positive effect of lower general caution (Hypothesis 1) and the negative effect of group assignment (Hypothesis 2) on contribution rates. Finally, Hypothesis 3 deals with the interaction between general caution and group affiliation.

We employ repeated measures analysis of variance (RM-ANOVA) to test mean differences with the two between-subject factors of high/low general caution and non-group/group assignment. The within-subjects effect of trial block is significant (Wilks' lambda = 0.79, $p < 0.001$), indicating that the main effect of contribution rate significantly changes over time. The interactions between trial block, group assignment, and general caution are not significant, suggesting that the changes in contribution rates over time are similar, irrespective of group assignment or levels of general caution. Indeed, the contribution rates in all conditions display a similar negative trend over time (Figures 2 and 3). However, the between-subjects effects of group assignment, $F(1, 109) = 2.85$, $p < 0.1$, and general caution, $F(1, 109) = 13.4$, $p < 0.001$, are borderline and highly significant, respectively. Finally, the between-subjects interaction effect of group assignment and general caution is borderline significant, $F(1, 109) = 2.76$, $p < 0.1$. These results indicate that there are some significant differences in overall contribution rates between conditions.

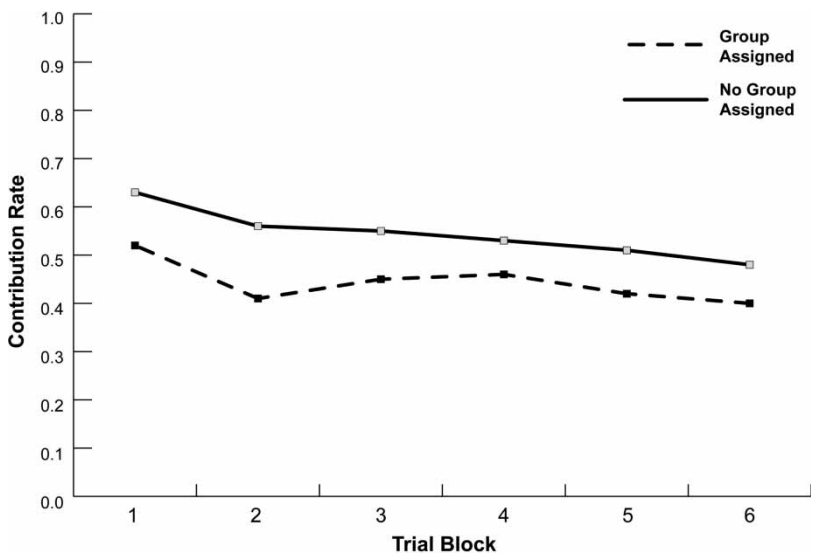

FIGURE 2 Contribution rates by group and non-group conditions.

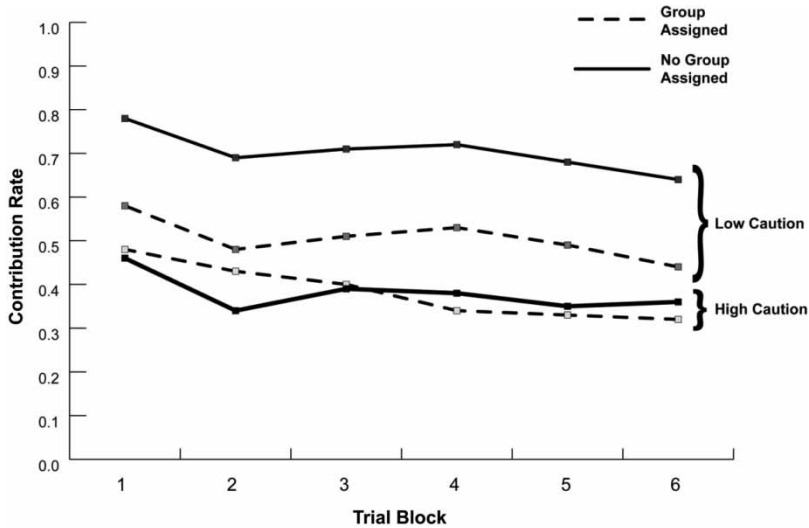

FIGURE 3 Contribution rates by low/high caution and group and non-group conditions.

We use pairwise comparisons to reveal the major differences in contribution rates between the two levels of each independent factor. The main effect of general caution shows that contribution rates are significantly higher for those with average or lower general caution ($M = 0.66$) compared to those with higher general caution ($M = 0.39$), $t = 4.2$, $p < 0.001$ (Figure 2). Based on the results of the RM-ANOVA, we already know that the main effect of group/non-group assignment is at best, minor. The average contribution rate for those in the non-group condition ($M = 0.53$) is marginally higher than that in the group condition ($M = 0.43$) and only borderline significant. Hypothesis 1 is supported and Hypothesis 2 receives limited support.

Hypothesis 3 predicts that the negative effect of group affiliation will be stronger for those with average or lower levels of general caution than those with higher levels of general caution. The pairwise comparisons explain why the main effect of general caution is strong, while the group and group × general caution interaction effects are marginally significant. For individuals with low levels of general caution, the mean difference between non-group ($M = 0.7$) and group assignment ($M = 0.5$) is significant, $t = 2.3$, $p < 0.05$. Among those with high levels of general caution, there is no difference between non-group ($M = 0.38$) and group assignment ($M = 0.38$), $t = 0.02$, $p = 0.99$. Thus, we observe a significant difference between non-group and group assignment among those with low levels of general caution, but find no group difference among those with high general caution (Figure 3). The effect of group affiliation is clearly moderated by one's level of general caution. Hypothesis 3 is supported.

Discussion

Blanchard *et al.* (2001) helped popularize the old truism, 'None of us is as smart as all of us'. This simple phrase captures the conventional belief that together, individuals accomplish more than they do on their own. The widespread success of internet information sharing systems that facilitate collaboration certainly appears to support this claim. Information pools such as Wikipedia, Amazon's Mechanical Turk, and file sharing systems show that the organized and coordinated efforts of many can lead to valuable outcomes that are greater than the sum of their parts (Cheshire & Antin 2009). There is no shortage of pundits who extol the virtues of online peer production, information sharing, and so-called Web 2.0 technologies (O'Reilly 2005). Yet, there are some who are slightly more reticent in their praise of online collaboration systems, noting that the outcomes are potentially valuable but individual effort varies greatly in quantity and quality. As *New York Times* commentator Pogue (2008) aptly states, 'Yes, you'll have to moderate this stuff...Yes, it's more work for everyone'. Within the broad discourse on online collaboration lies an implicit assumption that, given enough knowledgeable people, at least some individuals *will* contribute (Markus 1990). This simple assumption raises a deceptively challenging question: who among us is actually doing all the work?

The results of our study enhance our understanding of what types of people do the work of contributing to information pools. We find that individuals with lower levels of general caution are more likely to contribute in uncertain information sharing environments. Individuals with average or lower levels of general caution contribute 70 per cent more than those with high levels of general caution. This is especially remarkable, given that there are significantly less participants with average or low caution (44 per cent) compared to those with high caution (56 per cent). Thus, a minority of individuals who share a similar predisposition to be less cautious generate the majority of all contributions. In an age of alarmism about the dangers of online interaction and information sharing, popular wisdom suggests that cautious behaviour is necessary to protect oneself from harm. This may be sage advice in some circumstances, but it would be a mischaracterization to label individuals who are open to potentially risky online experiences as either gullible or naive. People who have lower caution may be demonstrating greater social intelligence, intentionally opening themselves to productive and mutually beneficial collaborative efforts despite the potential risks.

Prior research has shown that group membership and a sense of community can be a powerful motivation for contribution behaviours. Our study demonstrates one of the potential downsides to group affiliation and contribution behaviours in information sharing systems. We find that an abstract group affiliation, unrelated to the primary task, has a negative effect on participation in an information pool. This finding is consistent with the predictions about social loafing in

groups (Latané *et al.* 1979; Williams & Karau 1991; Karau & Williams 1993) and in other studies of information sharing (Ling *et al.* 2005). Even though participants in our experiment are part of the same collective effort, individuals who are explicitly affiliated with a group are slightly more likely to engage in social loafing than those with no group affiliation.

The type of abstract group in our study ('Group D') lacked characteristics such as common values, mutual trust, and prior acquaintance with group members, which, under the right circumstances, could develop over time and actually increase contributions (Rafaeli & Raban 2005). Group memberships that allow individuals to impart norms, develop trust, and share social capital through network ties can act as guarantors against malfeasance (cf. Portes 1998). We believe that the results of our study on abstract group associations should be interpreted in light of what they capture (pure group assignment through anonymous affiliation) and what they do not capture (network ties that allow the transmission of social capital, information, etc.). Thus, group affiliations are not diametrically 'good' or 'bad' for encouraging contributions. The key issue is whether group affiliations are arbitrary distinctions that encourage social loafing, or galvanizing community identities that encourage unity, trust, social capital, and a sense of shared purpose.

The interaction between general caution and group affiliation in our study helps to explain why the overall effect of group affiliation appears muted. Individuals with high levels of general caution are essentially unaffected by group affiliation – on average, they contribute 38 per cent of the time regardless of whether they are explicitly affiliated with a group or not. On the other hand, those with average or lower caution exhibit significantly different contribution behaviours based on the presence or lack of group affiliation. Among participants with average or lower caution, those who have no group affiliation contribute 40 per cent more than those who have a group affiliation. Although individuals with lower levels of caution are more vulnerable to the effects of social loafing than those with higher levels of caution, the lower caution social loafers still contribute 32 per cent more than their higher caution counterparts.

Limitations

Our experimental design provides a controlled environment to test our hypotheses. Like many laboratory experiments, however, a tightly controlled design sometimes comes at the expense of generalizability, ecological validity, or both. The use of a computer-mediated interaction environment and actual text transcription tasks from Project Gutenberg Distributed Proofreaders arguably enhance the external validity of our design. However, our experiment lacks the ecological validity of a real-world, unconstrained web surfing environment. In addition, the use of college students recruited on the basis of earning money limits our ability to detect potential behavioural differences across socio-

demographic characteristics such as age and education. Finally, our focus on a minimal group assignment speaks to one specific type of group affiliation (arbitrary assignment unrelated to the primary activity). This is clearly only one of the many different types of groups that can exist in online communities and systems.

Directions for future research and conclusion

The growing body of research on motivations to contribute information online primarily focuses on system design characteristics, economic incentives, and social motivations for participation. An unintentional consequence of this focus is that individuals are treated as a tabula rasa – lacking distinctive attitudes and predispositions but inclined to respond to various incentives and motivational feedback. Other studies explicitly incorporate individual attitudes and dispositions to build a more nuanced understanding of human motivation in a variety of contexts, including open-source software (Lakhani & Wolf 2005), peer-to-peer networks (Bretzke & Vassileva 2003), blogging (Liu *et al.* 2007), and Wikipedia (Zhang & Zhu 2006). Our results add to this effort and provide strong evidence of a relationship between contribution behaviours and pre-existing dispositions about social interactions. Furthermore, predispositions and attitudes can also act as key moderators for other situational effects such as group affiliation.

Important directions for future work include the observation of information sharing and online contribution in authentic, real-world internet environments with a socio-economically diverse population. As noted above, two key limitations of highly controlled experiments are narrow variation among participants (e.g. socio-demographically similar in education, age, etc.) and limited ecological validity. Given the strength of our findings in a controlled environment, a similar analysis of group affiliation and general caution across a large, socio-demographically diverse population would greatly enhance our understanding of online information sharing and social loafing. Online field experiments have proven to be an important tool for bridging the gap between the laboratory and the casual yet complex nature of online information sharing and interaction (Cheshire & Antin 2008, 2009).

Finally, we believe that future research should combine knowledge of individual predispositions with feedback mechanisms to better understand how to encourage existing contributors, as well as those who might be less likely to contribute in the first place. Many researchers argue that certain aspects of one's communication and group behaviour can be fed back into an information system to encourage behaviour on an individual basis (Rafaeli & LaRose 1993; Constant *et al.* 1994; Kollock & Smith 1996). However, the ability to create unique feedback mechanisms typically depends on knowledge about existing user behaviour. One of the key problems we have identified in this study is that individual predispositions can strongly associate with one's level of

contribution. If we fail to take account of pre-existing dispositions, we risk over-inflating the influences of various incentives, mistakenly motivating only a subset of users, or missing other effects entirely. The relationship between general caution and the effect of group affiliation in our study clearly underscores this point.

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Notes

1 The exclusion rate for the study was 6.6 per cent; two participants were excluded because they did not correctly respond to the manipulation check and six more were excluded due to software and data collection issues.

2 The point structure of the text transcription tasks creates an *n*-person prisoners' dilemma, in which each participant has a rational self-interest to not contribute. The aggregate effect of each individual decision leads to a collectively deficient outcome, where everyone earns less (or nothing at all) if no one contributes.

3 Experience within the study should not affect post-questionnaire responses because participants were not given any information about the quantity of contributions provided by others. If responses were affected, it would influence all participants equally. We only analyse *relative* differences between responses in our sample, negating the potential impact of such effects.

4 We conducted the same analysis by excluding those with average levels of caution to ensure that these individuals were not biasing the results one way or the other. We found the same effects when individuals with average caution were eliminated.

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