Group Remembering: Does Social Loafing Underlie Collaborative Inhibition?

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When people collaborate to recall information, they experience collaborative inhibition, a deficit in recall relative to nominal groups (the pooled, nonredundant recall of individuals working alone). That is, people recalling in groups do not perform up to their potential. Collaborative inhibition may be due to retrieval interference (e.g., B. H. Basden, D. R. Basden, S. Bryner, & R. L. Thomas, 1997) or to motivational factors such as social loafing in the group situation. Five experiments examined the role of motivational factors by varying monetary incentives, recall criterion, personal accountability, group cohesion, and group gender. Increasing motivation sometimes increased the overall level of recall but failed to eliminate the collaborative inhibition effect. The results suggest that collaboration interferes with an individual's ability to reconstruct his or her knowledge.

Although remembering is usually studied as a process within the individual mind, recollection frequently occurs as a social activity. For example, eye witnesses often recount crimes as a group, friends and families reminisce about past experiences, and government and news agencies reconstruct events to report to the public. Yet relatively little is known about the nature of remembering as a social process or the memorial effects of the dynamic interplay between the individual and the social context (see Weldon, 2000).

A handful of investigators interested in the social nature of memory have approached this topic from several interesting angles. For example, the study of transactive memory examines how shared memory systems develop between people who know each other well. Individuals in ongoing relationships develop a distributed memory system, such that they divide responsibility for the encoding, storage, and retrieval of information from different domains according to their implicitly shared knowledge of each other, and they jointly remember information better than do strangers (e.g., Hollingshead, 1998; Johansson, Andersson, & Rönnberg, 2000; Wegner, 1987, 1995; Wegner, Erber, & Raymond, 1991). In a related vein, it has been observed that for older adults collaboration can overcome some of the memory deficits associated with aging; when allowed to work together, couples married for more than 40 years can recall as much as young married couples (Dixon & Gould, 1996). Other work focused on the comparison of individual and group remembering, which appear to differ in some important ways. Not surprisingly, groups recall more than a single individual (e.g., Lorge & Solomon, 1961; Yuker, 1955), and group recognition is more accurate than individual recognition (S. E. Clark, Hori, Putnam, & Martin, 2000; Hinsz, 1990). Groups also appear to be more confident in their answers than are individuals, but groups demonstrate less testimonial validity, meaning that their confidence ratings discriminate less well between their accurate and inaccurate answers (Stephenson, 1984; Stephenson, Brandstatter, & Wagner, 1983). Groups may also show more extreme biases in their recall than do individuals. For example, in a mock jury study participants' attitudes strongly influenced their recall of the evidence, but collaborative recall was more biased than the individual recall of the most biased person in the group (Sheppard, 1980, as reported in Hartwick, Sheppard, & Davis, 1982). Finally, there is evidence that groups arrive at stable accounts of their experience more rapidly than do individuals, implying that group recollection may lead to a more rapid consolidation of a long-term account of an event (N. K. Clark & Stephenson, 1989; Weldon, 2000; Weldon & Bellinger, 1997).

Of interest here is the question of how collaboration in group recall affects the overall level of retrieval relative to individual recall. Collaboration conceivably could improve individual performance through the process of cross-cuing, whereby the material recalled by each person serves as a retrieval cue for others' recall of additional material (Meudell, Hitch, & Boyle, 1995). However, this is not the case. To test this, the performance of collaborating groups has been compared with that of nominal groups, which are groups in name only. Nominal groups are created by pooling the nonredundant responses of individuals working alone. In studies of dyads, collaboration either produces no benefit (Meudell, Hitch, & Kirby, 1992; Meudell et al., 1995) or impairs recall relative to nominal groups (Andersson & Rönnberg, 1995, 1996). In studies of triads (groups of three), Weldon and Bellinger (1997) observed significant impairment in collaborative recall of both words lists and the story "War of the Ghosts," a phenomenon they termed collaborative inhibition. Collaborative inhibition has also been...
The goal of this work is to understand the basis of collaborative inhibition. Two primary hypotheses have been advanced to explain it. First, collaboration may produce retrieval interference similar to that observed in part-set cuing, whereby people provided with a subset of the to-be-remembered information suffer impaired retrieval of the remaining information, presumably because of retrieval interference caused by the presented items (Roediger & Neely, 1982; Slamecka, 1969; see the review by M. C. Anderson & Neely, 1996). Alternatively, collaborative inhibition may be due to motivational factors that can influence behavior in group settings, such as social loafing, which occurs when people working in groups reduce their individual effort (Latané, Williams, & Harkins, 1979).

Basden, Basden, Bryner, and Thomas (1997) provided evidence that retrieval interference underlies collaborative inhibition. They suggested that hearing other group members recall the material disrupts one’s own subjective organization and retrieval strategies. Accordingly, they reasoned that highly organized material such as small categories of items should be less susceptible to disruption during recall, because there is little room for idiosyncratic organization of the material. Consistent with this hypothesis, when triads studied and recalled lists containing 15 six-item categories, collaborative inhibition was eliminated in instance recall. That is, given that a category was accessed, collective groups recalled the same number of category members as did nominal groups. Further evidence for the role of retrieval disruption was provided by a measure of category clustering, which was significantly higher in individual than group recall, suggesting that group recall was more disorganized. Work by Finlay, Hitch, and Meudel (2000) also indicates that retrieval disruption contributes to collaborative recall. Dyads studied word pairs and then received either a free- or a cued-recall test. The usual collaborative inhibition effect was obtained in free recall but was eliminated in cued recall, presumably because the cues provided item-specific retrieval information, which overrode the role of idiosyncratic retrieval strategies. In summary, there is good evidence that retrieval interference contributes to collaborative inhibition. However, the role of motivational factors remains to be explored. With sufficient motivation and effort, can collaborating groups achieve their potential?

The hypothesis that reduced motivation underlies collaborative inhibition in recall is suggested by research on other tasks that exhibit analogous losses of individual productivity during collaboration or in group settings. This occurs with all kinds of activities, including physical tasks like rope pulling, clapping, and shouting (e.g., Harkins, Latané, & Williams, 1980; Ingham, Levinger, Graves, & Peckham, 1974; Latané et al., 1979; Williams, Harkins, & Latané, 1981), cognitive tasks like brainstorming and recall (Taylor, Berry, & Block, 1938; Weldon & Bottom, 1997), perceptual and perceptual-motor tasks like vigilance and maze learning (e.g., Griffith, Fidhman, & Moreland, 1989; Harkins & Petty, 1982), evaluative tasks like quality ratings (Petty, Harkins, & Williams, 1980), and bystander intervention in emergency situations (Latané & Nida, 1981). One proposed explanation is free riding or social loafing, the finding that people exert less effort when working on collective tasks than when working alone (Karau & Williams, 1993). A variety of mechanisms have been proposed to account for social loafing effects, including the possibilities that

in group work (a) personal accountability is diminished, that is, because it is difficult to identify individual contributions, it is easier for people to exert less effort without being noticed; (b) there is perceived dispensability of effort, that is, people may believe that their own contribution is not important because it will not make much difference in the final group outcome; (c) individuals may attempt to achieve an equity of effort, so that their performance level matches that of the others in the group, but this will be low because each person’s output per unit time is initially limited by having to allow others to take their turns; and (d) there is a diffusion of responsibility, or feeling that one is less accountable for the group’s behavior than for one’s own individual behavior (Latané & Nida, 1981). Another motivational mechanism that may impair group performance is evaluation apprehension. That is, people may worry about how they appear to others in the group and do not want to be evaluated negatively if they make a contribution that is perceived as inadequate or erroneous by other group members (Collaros & Anderson, 1969; Diehl & Stroebe, 1987). Thus, rather than embarrass themselves, they set a very high criterion for the quality of the contributions they choose to make. The goal of the present work is to determine whether these motivational factors underlie collaborative inhibition in recall.

There is evidence that social loafing does play a role in the loss of group productivity in some situations. For example, Latané et al. (1979) monitored individual performance in shouting and clapping tasks and found that when people believed that they were members of a group, they shouted or clapped less loudly than when they believed they were acting alone. However, what about cognitive tasks? Brainstorming would appear to be the task most relevant to the recall task because both are relatively high-level cognitive tasks in which participants have to think of ideas without the support of external cues. The role of social loafing is less clear in cognitive tasks like brainstorming than it is for physical tasks. Many brainstorming studies use a procedure in which participants are led to believe that they are contributing to a group, although they do not actually collaborate aloud with one another. For example, one common procedure is to tell participants in the “collective” condition that their answers will be grouped with others’ answers, and each person writes his or her answers on slips of paper and then puts the slips in a collective box. However, group members do not actually hear each others’ contributions. Collective performance is then compared with a nominal condition in which each participant is told that he or she alone is responsible for generating ideas, and the answers are collected separately for each individual. With this procedure, evidence for social loafing in brainstorming has been obtained. For example, people in the collective condition perform as well as those in the nominal group when their motivation is increased by making the task relatively more challenging and interesting (Harkins & Petry, 1982) or when group members are led to believe that their individual contributions will be counted, evaluated, or compared with the performance of others (Harkins, 1987; Szynanski & Harkins, 1987). Correspondingly, when motivation is reduced by telling people that their performance is not important to their evaluation, it adversely affects performance in collective groups more so than in nominal groups (Price, 1993).

Overall, such experiments suggest that the lower group performance observed in brainstorming tasks is at least partly due to reduced motivation. However, these outcomes may not generalize...
Experiment 1 participants were offered a monetary incentive to understand play a role in collaborative inhibition during recall. In performance beyond what may be attributable to reduced motivation other members of the group, as occurs in the free-recall paradigms that have been used. Thus, it is possible that overt collaboration gives rise to cognitive interference, which impairs group performance beyond what may be attributable to reduced motivation alone.

The present experiments were designed to examine whether motivational factors such as social loafing and evaluation apprehension play a role in collaborative inhibition during recall. In Experiment 1 participants were offered a monetary incentive to improve their performance. In Experiment 2 they were forced to recall a relatively large number of items before they could leave the laboratory. Experiment 3 required that each participant’s recall be individually identifiable. In Experiment 4 we increased group cohesiveness by having participants participate in an activity to get acquainted, and in Experiment 5 we tested only all-female groups. If collaborative inhibition during recall is due to reduced motivation or more conservative responding in interacting groups, then it should be eliminated when either motivation is increased or the cost of errors is decreased.

General Method

The following materials and procedures were used in all experiments. Unique features of each experiment are explained as needed.

Participants and Design

Participants were undergraduates at the University of California, Santa Cruz (UCSC) recruited for course credit. They were always tested in groups of three. One variable manipulated in all experiments was group type. In the nominal condition, participants worked alone to recall the items, and in the collaborative condition, they worked together interactively to recall the items.

Materials

Target items were 50 unrelated words of relatively low frequency, such as folklore, superstition, martini, plus three buffer words at the beginning and end of the list, yielding a total list length of 56 items. Buffer items were not scored in the recall test. Items were presented in random order on slides.

Procedure

Participants were tested in groups of three, and each group was randomly assigned to either the nominal or collaborative recall condition. The group was instructed that they were going to see 56 slides and later would receive a memory test for the items, but they were not told how they would be tested. They were instructed not to talk or write down items during the study phase. The room lights were dimmed, and the slides were presented for 4 s each. At the end of the slide presentation, participants performed a filler task in which they worked on mazes individually for 5 min and then received the free-recall test. Participants in the nominal recall condition were told to work alone and write down every word they could remember from the slides; they were instructed not to talk aloud or look at others’ answer sheets. Participants in the collaborative recall condition were given a sheet of paper, and one person was asked to volunteer to be the recorder for the group. They were instructed to work together to recall the items, and the recorder would write everything on the paper. The recorder also was instructed to participate in the recall and to say aloud the words he or she recalled so that everyone could hear. The recall period was 10 min, which was more than sufficient time for people to recall everything they could think of during the session. After 8 min, participants were encouraged to try as hard as they could to recall some more items, and after 2 min more the recall sheets were collected.

Free-Recall Scores

A strict recall criterion was used such that the word had to be recalled in the same grammatical form in which it was presented, but plurals were accepted. Lenient scoring did not change the pattern of results. For the collaborative groups, the total number of target items recalled was counted. For the nominal groups, the number of target words recalled was pooled across all three individuals in each group, with redundant items counted only once. For example, if three people recalled folklore, the group received only one point. As such, the nominal group score represents the potential number of items the collaborative group could recall if there is no facilitation or inhibition produced by the process of collaboration. Data are reported as proportion recalled in Table 1. Statistical significance is reported at \( p < .05 \) unless otherwise noted.

Experiment 1: Monetary Incentive

The purpose of Experiment 1 was to use a straightforward motivational manipulation to determine whether collaborative inhibition is due to social loafing. Perhaps participants in the collaborative groups are actually able to recall more items than they do but simply do not put forth the effort because of a diffusion of personal responsibility. If so, then increasing their personal investment in the outcome should increase their personal effort. People in the high-incentive condition were told that the group that recalled the most words would receive a $60.00 reward, $20.00 for each group member. It was hypothesized that this would motivate participants to work harder to recall the words and eliminate collaborative inhibition.

Studies have shown that individual retention can be improved with external incentives. For example, people offered money to remember so-called high-incentive items recall them better than low-incentive items (Eysenck & Eysenck, 1980; Eysenck & Eysenck, 1982). Also, group performance on paper folding and brainstorming tasks can be improved by offering extrinsic incentives such as additional experimental credit (Shepperd & Wright, 1989; Zaccaro, 1984), but the implications for group remembering are unclear because these collective tasks did not involve overt interaction or discussion about the tasks. The current experiment

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examine whether external incentives can improve group remembering to the extent that collaborative inhibition is eliminated.

Method

Design. The experiment was a 2 X 2 between-participants design, with recall condition (nominal vs. collaborative) and incentive (no incentive vs. high incentive) as the independent variables. Fourteen groups were tested in the nominal/no-incentive condition, and 15 groups were tested in each of the other three conditions.

Procedure. Materials and procedures were as described in the General Method, but a high-incentive condition was added. In this condition, participants in both the nominal and collaborative groups were told before the study phase that the group that recalled the most items would receive a $60.00 award and were assured that the money would be awarded (which it was). The high-incentive instructions were given before the study phase to give the participants the opportunity to study the words as well as possible. Before beginning the free-recall test, participants in the high-incentive groups were reminded of the monetary reward.

Results and Discussion

The average proportion of items correctly recalled is presented in Table 1. The data indicate that, although the incentive improved the overall level of performance, it did not eliminate the collaborative inhibition effect. A 2 X 2 between-participants analysis of variance (ANOVA) revealed a main effect of recall condition, F(1, 55) = 7.21, MSE = .09, indicating that nominal groups (M = .51) recalled more than collaborative groups (M = .43). There was also a main effect of incentive, F(1, 55) = 4.51, MSE = .05, such that participants in the high-incentive condition (M = .50) recalled more than those in the no-incentive control condition (M = .44). However, the interaction between recall condition and incentive was not significant, F(1, 55) < 1.

These results argue against the idea that collaborative inhibition in recall is due to social loafing. Offering a monetary award increased the overall level of performance of both individuals and interacting groups, indicating that the award was sufficiently motivating to induce people to work harder at learning and recalling the material. However, it failed to eliminate the impaired performance of the collaborative group, suggesting that collaborative inhibition is not simply due to a reduction in people's motivation to contribute to the group. Nevertheless, there may be motivational factors at work in the group setting that are not affected by monetary incentives, so further efforts to manipulate motivation were deemed necessary.

Experiment 2: Forced Recall

One possible explanation of impaired performance in collaborating groups is that individuals may experience evaluation apprehension; that is, they may be reluctant to contribute because they fear that their response will be seen as inadequate or erroneous. It is noteworthy that research on brainstorming does not provide strong support for this idea. Reducing evaluation apprehension has been shown to increase the number of ideas generated, but not to eliminate the deficit observed in collaborating groups (Diehl & Stroebe, 1987). Nevertheless, it is necessary to test this in group recall.

In recall, evaluation apprehension could be manifest by adopting a conservative recall criterion; that is, people may recall an item only when they are very certain that the word was on the list so as to avoid embarrassing themselves with an incorrect answer. To avoid this in Experiment 2, we created a situation in which participants would be rewarded for setting a liberal criterion and even for producing incorrect responses. People were told that they had to recall a certain number of items before they could leave the experiment, so they should recall anything that came to mind even if they were uncertain as to whether it was correct.

To strengthen this manipulation further, we addressed another hypothesis about social loafing, which is the idea that people will calibrate their performance to meet a perceived standard of performance. For example, people working in groups may attempt to achieve equity of effort with others in the group so that they do not work harder than everyone else. This would tend to reduce group performance either because, on average, the high-performing individuals would adjust their effort to equalize their performance with lower performers or because the initial rate of participants' recall is slowed by having to take turns. Evidence for this process comes from a paradigm in which participants performed three successive brainstorming tasks, either collaboratively (group-group-group) or alone and then collaboratively (alone-alone-group; Paulus & Dzindolet, 1993). The correlation between levels of performance in the first and third sessions was higher in the group-group-group condition (r = .92) than in the alone-alone-group condition (r = .28), indicating that the performance level established in the first session carried over to subsequent sessions for the groups and exerted a stronger normative influence than for individuals working alone. Furthermore, when participants were given information about people's "typical performance" on the task, but which was actually 2.5 times the real level of typical performance, their performance increased significantly in both nominal and collaborating groups, but the relative deficit in collaborating groups remained. Because participants were generating their ideas aloud in this experiment, it lends credence to the idea that interference may arise from overt collaboration, beyond any effects of social loafing per se.

The goal of this experiment was to test the idea that evaluation apprehension and low performance standards lead people to withhold answers during collaborative recall. By setting a high performance standard and forcing people to recall a prescribed number of items, we attempted to lower participants' output criteria and also reward them for recalling even those items about which they were uncertain.

Method

Design. There were two experimental conditions: nominal versus collaborative recall. Ten groups of three participants were tested in each condition.

Procedure. In the nominal condition (individual recall), before presentation of the slides, participants were told to study the 56 slides for a memory test. They were instructed that typical students remember about 18 items, but we believed that students at UCSC had better memories than students at other universities, and we expected that they would be able to remember about 24 words. This was about 2.25 times greater than the level of individual performance observed in Experiment 1.

Participants in the collaborative recall condition received similar instructions, except they were told that typical students remember about 30 items, but they should be able to remember about 40, again about 2.25 times collaborative group performance in Experiment 1.
Results and Discussion

Results are presented in Table 1 and were analyzed with an independent-group *t* test. Nominal groups (*M* = .56, *SD* = .13) recalled significantly more items than collaborative groups (*M* = .40, *SD* = .15), *t*(18) = 2.38. Thus, reducing evaluation apprehension and setting a high performance standard failed to eliminate the collaborative inhibition effect. In fact, if one compares these means to the control conditions of Experiment 1 (no-incentive conditions), it appears that the collaborative inhibition effect is even larger here because of an increase in performance in the nominal group condition (from .48 in Experiment 1 to .56 in Experiment 2), but no change in the collaborative group condition (.39 vs. .40, respectively). Of course, it is tricky to compare across experiments, but the point is that our efforts to lower the participants' output criteria and set a high standard of performance failed to eliminate or even reduce the impairment that arises in collaborative relative to individual recall. Of course, it is not known for certain whether the manipulations substantially reduced participants' evaluation apprehension or overcame a tendency to match performance with others, because there is no direct manipulation check. Nevertheless, the fact that forced recall did not increase the number of targets retrieved by the collaborative groups does argue against the idea that people in the collaborative groups are accessing the same number of words as the individuals but are withholding those items about which they are less confident. These findings are consistent with the conclusion reached in Experiment 1 and suggest that collaborative inhibition is not due to motivational factors such as social loafing or evaluation apprehension that might reduce one's contributions to the group.

Experiment 3: Personal Accountability

Another motivational account of reduced productivity in groups suggests that when people work in groups they feel less personally accountable for the outcome, such that there is a diffusion of responsibility leading to decreased individual effort. Alternatively, group members may feel like they will not receive appropriate credit for their individual efforts and, therefore, feel it is not worth their while to work as hard as they would on their own. In either case, the hypotheses suggest a pivotal role for individual accountability, such that if accountability is increased, then group performance should improve. In brainstorming, when people are told their performance will be examined individually, performance increases whether working alone or as a member of a collective (e.g., Harkins & Petty, 1982). However, such personal assessment does not appear to eliminate or reduce the collaborative group deficit in groups that are actually stating their ideas out loud (Diehl & Stroebe, 1987).

Here we examined whether increasing personal accountability would eliminate collaborative inhibition in group recall. Personal accountability was established by writing participants' names on the answer sheets, and writing the words each person recalled under his or her name.

Method

Design. The experiment comprised a between-participants design, with group type (nominal vs. collaborative) as the independent variable. Fifteen groups of three participants each were tested in each condition.

Procedure. Participants were instructed to study the slides for a memory test but were not told the nature of the testing conditions until it was time for the recall test. In both test conditions, the experimenter sat at the head of the table, with the participants seated around the sides. In the nominal group condition, each participant was given a separate piece of paper and told to write his or her name at the top and also to say it aloud so the experimenter could write it in the log. They were then instructed to recall as many words as possible and write them down under their name as they thought of them.

In the collaborative group, the experimenter asked each participant to say his or her name aloud and then wrote it atop one of the three columns on the answer sheet. The answer sheet was visible to the participants. Participants were instructed to say the words aloud as they came to mind, and the experimenter wrote each word under the name of the person who recalled it. The recall procedure continued for 20 min in both conditions.

Results and Discussion

The results are presented in Table 1 and were subjected to an independent-groups *t* test. Nominal groups (*M* = .49, *SD* = .10) recalled significantly more than collaborative groups (*M* = .41, *SD* = .08), *t*(28) = 2.72. These results indicate that the heightened personal accountability introduced by drawing attention to each person's individual contribution failed to eliminate collaborative inhibition. This adds further support to the conclusions of Experiments 1 and 2 that the group deficit in recall is not due to motivational factors.

Experiment 4: Group Cohesiveness

The goal of Experiment 4 was to examine whether group performance might improve when group members are more cohesive. If people feel more familiar or connected with other members of the group, they may feel less afraid of making a mistake, be more flexible in coordinating their recall strategies, or be more invested in the group outcome, any of which could lead to better performance.

At least two interesting lines of evidence suggest that the nature of interpersonal relationships matters in remembering. First, research on transactive memory (e.g., Wegner et al., 1991) demonstrates that members of close couples remember more total information than pairs of strangers as long as they are able to approach the material in their own way. This advantage occurs even though the couples are not overtly communicating their study strategies. However, when the experimenter assigns the to-be-remembered categories to the participants, strangers remember more than close couples. This pattern suggests that people develop knowledge about each others' strengths for remembering certain kinds of information and then implicitly use this knowledge to allocate responsibility for remembering new information. Additional evidence suggests that highly coordinated transactive memory systems may even counteract the negative effects of collaboration. In a study of older couples performing collaborative prospective and retrospective memory tasks, couples who had been together for about 45 years and who also explicitly stated that they used strategies to optimize their joint performance remembered as much as nominal dyads working independently (Johansson et al., 2000). In a similar vein, older couples collaborate so well that they can remember as much as young couples, indicating that people can develop effective ways of interacting and maximizing the amount
of material they recall (Dixon & Gould, 1996). Finally, consistent with these ideas is the finding that when a member of a dyad is asked to generate recall cues that will be used by his or her partner to recall the word list, friends produce more effective cues for each other than do strangers (Andersson & Rönning, 1997).

The second source of evidence that the interpersonal closeness of group members may correlate with group performance comes from the finding that dyads composed of friends tend to suffer slightly less collaborative inhibition than do dyads of strangers, at least for recall of relatively complex material such as stories and videotaped lectures (Andersson & Rönning, 1995). However, this effect tends to be quite small and was not obtained with word-list recall, which is the material used here.

These studies lay a foundation for postulating that group cohesiveness may reduce collaborative inhibition in group remembering. If so, the effect could be due to a variety of mechanisms, such as reduced evaluation apprehension, heightened motivation to work with the other members, or the rudiments of a transactive memory system developing among group members as they learn more about each other. To test the effects of group cohesiveness on group remembering, we adapted a procedure that has been shown to establish at least a temporary increase in group cohesion (Turner, Pratkanis, Probasco, & Leve, 1992). The groups in the high-cohesion condition were instructed to spend 5 min discussing how they were similar to one another and then come up with a group name. We do not intend to suggest that this manipulation will produce the type of well-developed transactive memory system that leads to the effective collaboration seen in close couples, mentioned previously. Such interpersonal knowledge and its benefits in remembering appear to require long-term social interaction to develop. Rather, here it is assumed that a positive effect of group cohesiveness would likely arise because the group members would be more at ease socially, would be more motivated, or would learn a little about the interests of the other group members, any of which might help the group coordinate its efforts more effectively.

Method

Design. The experiment comprised a 2 X 2 between-participants design, with group type (nominal vs. collaborative) and group cohesion (low vs. high) as the independent variables. Ten groups of three participants were tested in each condition.

Procedure. Participants received the cohesion manipulation at the beginning of the experimental session. In the high-cohesion condition, they were told that, because they were going to spend an hour together doing a variety of tasks, we wanted them to have a chance to get to know each other first. They were instructed to spend 5 min discussing how they were similar to each other, and one person was asked to volunteer also to write these things down for the group. At the end of the 5 min, they were asked to come up with a "team name" and write it at the top of the paper.

Participants in the low-cohesion condition were told that they were going to start the session by spending 5 min thinking about how each person him/or herself might be unique and different from the others in the group and to write these differences on their own paper. They were also instructed to keep their paper private so that the other members of the group could not see it.

After the cohesion manipulation, the experiment proceeded as described in the General Method except for a change in the distractor task. For the distractor task, rather than performing the mazes, participants were given an outline of the United States and instructed to fill it in as well as possible.

Participants in the high-cohesion conditions were instructed to do this together, whereas participants in the low-cohesion conditions worked alone. Pilot testing had demonstrated that people particularly enjoy this task when working with others, and it tends to lead to lively interactions, so we thought it would further strengthen the cohesiveness of the high-cohesion groups. Participants worked on this task for 20 min in all conditions and then recalled the word lists either collaboratively or individually.

At the end of the recall session, participants were given a six-item questionnaire:

1. How cohesive do you think your group was?
2. Do you think that your group worked well together on the tasks that you performed together?
3. Would you want to remain a member of this group on future projects?
4. Overall, how much did you like the other members of your group?
5. How similar do you think you are to the other members of your group?
6. How motivated were you to do well on the memory tests?

Participants answered each question on a rating scale ranging from 1 (not at all) to 7 (very much).

Results and Discussion

The average proportion recalled in each condition is presented in Table 1. An ANOVA revealed no effect of group cohesion (F < 1), but the effect of group type just bordered on conventional significance, F(1, 39) = 3.64, MSE = .06, p = .065; the nominal groups (M = .44) recalled more than the collaborative groups (M = .36). The interaction between group type and cohesiveness was not significant (F < 1).

Even though the difference between the nominal and collaborative groups did not quite achieve the conventional cutoff, these results cannot be interpreted as evidence that high group cohesion eliminated or even reduced the collaborative inhibition effect. First, the overall level of performance and the difference between the nominal and collaborative groups are within the same range as most of the prior experiments, including the no-incentive control condition in Experiment 1 (i.e., about an 8 to 9 percentage-point difference between the nominal and collaborative conditions). Second, if anything, the collaborative inhibition effect in the high-cohesion condition is slightly larger than that in the low-cohesion condition (see Table 1), so, although not quite significant, the numerical trend is in a direction opposite the hypothesis. We tested slightly fewer groups per condition in this experiment (10) than the others (12-15), so the power to detect a difference between the nominal and collaborative groups here was somewhat low, .459. Under these circumstances, it would be inappropriate to accept the null hypothesis. The appropriate conclusion is that nominal groups continued to outperform collaborative groups, and the results continue to argue against the idea that poor group performance in collaborative recall is due in any large measure to motivational factors.

One might reasonably question whether the cohesiveness manipulation had the intended effect, and the results of the postexperiment questionnaire indicate that it did. These are presented in Table 2. When participants were asked how cohesive their group was, there was a significant effect of the cohesiveness manipulation, F(1, 119) = 24.48, MSE = 27.55; participants in the high-cohesion condition rated their groups as more cohesive (M = 5.1) than those in the low-cohesion condition (M = 4.2). Participants in the high-cohesion condition also thought their groups worked
The proportions recalled are presented in Table 1. An independent-samples t test revealed a significant effect of recall condition, such that the nominal groups (M = .54, SD = .09) recalled significantly more than the collaborative groups (M = .46, SD = .09), t(23) = 2.12. This finding argues against the hypothesis that collaborative inhibition in the free-recall task used here is due to inadequate opportunities to contribute or an inhospitable situation for female participants. Even if women participate somewhat less overall in mixed-gender groups, it does not explain the
relative difficulty that people have recalling information collaboratively compared with individually.

**General Discussion**

Five experiments were conducted to examine whether motivational influences arising from the social setting give rise to collaborative inhibition in recall, which is the phenomenon that interacting groups recall less than nominal groups (pooled individuals). Past research has demonstrated that group performance suffers in various physical and cognitive tasks, an effect that has been attributed to a variety of causes such as social loafing, evaluation apprehension, setting low performance standards, maintaining equity of effort, and production blocking. The question addressed here was whether any of these mechanisms contribute to impaired group recall and whether increasing the participants’ motivation to recall the material could overcome the interference produced by the group recall process. The answer appears to be no. In Experiment 1, we found that a monetary incentive increased overall performance but did not eliminate the collaborative inhibition effect. In Experiment 2, participants were forced to recall a relatively large number of items to achieve a target performance standard in an effort to reduce evaluation apprehension and lower participants’ criteria for contributing answers; this too failed to improve the performance of collaborating groups. In Experiment 3, we increased personal accountability by writing each participants’ answers under his or her name, but collaborating groups still performed worse than the nominal groups. In Experiment 4, we examined whether increasing group cohesion would overcome the collaborative disadvantage, but it did not. Finally, in Experiment 5, we tested the possibility that impaired group performance occurs because women participate less when they work in mixed-sex groups, but even with female-only groups significant collaborative inhibition was obtained. Taken as a whole, these findings suggest that motivational factors play little if any role in inhibiting group recall. Therefore, an explanation must be sought elsewhere.

As discussed previously in this article, earlier research produced evidence that retrieval interference operates when people work together to recall word lists. Basden et al. (1997) demonstrated that, when lists contained categories with few items or when participants were assigned responsibility for recalling different categories at the time of recall, collaborative inhibition could be eliminated. Thus, when there was little room for idiosyncratic organization or for disruption of personal retrieval strategies, collaborating groups recalled up to their potential. In addition, group recall exhibited less category clustering than individual recall, indicating that groups are more disorganized, presumably because of the disruption caused by others (also see Weldon & Bellinger, 1997). Basden et al. argued that collaborative inhibition is analogous to part-list cuing inhibition, and in the case of group recall the process of hearing other people’s recall disrupts one’s own retrieval strategies, making it difficult to access all the material that would otherwise be available. Additional support for this hypothesis is provided by the fact that collaborative inhibition can be eliminated with a cued-recall test, presumably because the cue provides effective item-specific access to the desired information, overriding the distracting effects of others’ recall (Finlay et al., 2000).

It appears that the interference produced by collaborative recall disrupts reproduction of the material, and this is a powerful effect that cannot be overcome by sheer effort or will. If motivational factors play a role at all, it is small and difficult to detect. This is not to say that motivational factors will never influence group recall or other collective cognitive tasks. We suspect that in some circumstances motivational factors may indeed modulate performance beyond the effects of interference, such as when people are working on more complex tasks, when people are working in larger groups, in situations in which the stakes are high (such as high costs of mistakes or substantial benefits of contributions), or in conditions with pronounced imbalances in the distribution of power and labor. However, with the standard recall paradigm used here, cognitive interference appears to be a better explanation of the collaborative interference effect in recall.

What is the nature of the interference? As mentioned, good evidence exists that group recall leads to disruption of the individuals’ retrieval strategies, impeding access to the material. However, other mechanisms should also be considered. For example, collaborative recall can be seen as a divided-attention task, requiring that resources be allocated to both recall and social monitoring. When less attention needs to be allocated to social coordination, more resources may be available for recall. This possibility remains to be explored.

Another possibility is that collaborative inhibition is an instance of production blocking, an idea from the group brainstorming literature that emphasizes the interplay between cognitive and social factors (Diehl & Stroebe, 1987). Specifically, Diehl and Stroebe reported evidence that collaboration can interfere with the production of ideas. This may arise from a variety of factors that operate during collaboration; for example, having to wait one’s turn to speak may lead to forgetting or the inability to generate more ideas, hearing others’ ideas may make one’s own seem less valuable, or hearing others speak may be distracting and interfere with one’s own thoughts. Their data provided strong evidence that the processes of monitoring others’ participation and waiting one’s turn are major sources of interference in group brainstorming, although, interestingly, actually hearing others’ ideas produced only a small, nonsignificant increase in interference. Thus, their results raise the question of whether collaborative recall suffers only from the disruption of retrieval strategies per se or also from general interference arising from social coordination. Regardless of our ultimate understanding of the processes of collaboration, one point to be emphasized is that, when one begins to inspect the social elements of remembering, it becomes clear that the social and cognitive dimensions are difficult to disentangle. It is difficult to demonstrate that our manipulations uniquely affected social-motivational factors as opposed to cognitive factors.

Is it possible for people to collaborate and not suffer interference? One perspective that warrants consideration is the possibility that encoding-retrieval interactions contribute to the collaborative inhibition effect. The encoding specificity principle (Tulving & Thomson, 1973) and the transfer-appropriate processing framework (Morris, Bransford, & Franks, 1977) postulate that retrieval will benefit to the extent that there is overlap between the encoding and retrieval cues or processes. Notice that in the individual recall condition people both encode and recall the material alone, but in the collaborative recall condition there is a mismatch such that people encode alone but recall with a group. This mismatch may
contribute to the disadvantage experienced by the group. Some evidence for this effect exists in data reported by Anderson and Rönberg (1997), but further research is needed.

One might be tempted to interpret the phenomenon of collaborative inhibition as evidence that collaboration is a poor strategy and that people should work alone to avoid interference from others, but this would be an inappropriate conclusion. Weldon and Bellinger (1997) examined recall on successive trials and discovered that even though groups do not perform up to the level of the individuals' pooled potential, individuals still benefit from working in groups. In both word-list and story recall, individuals always recalled more on a second trial if they had previously worked in a group (collaborative recall) than if they had worked alone (individual recall). Even though the individual may fail to recall some material while working in the group, the other members of the group still recall many items that the individual would not have recalled on his or her own, so overall the individual is reexposed to many more items in group recall than individual recall. Therefore, collaboration can benefit individual memory in the long run. Furthermore, the costs of collaboration can be overcome by providing multiple study-test trials (Basden et al., in press). Ultimately, whether it is preferable to have people work alone or in a group depends on the goals and the task: If the goal is to obtain the highest possible output, without concern for individual learning, then working alone and pooling the results is better than collaboration. However, if the goal is to increase the amount of material each person ultimately learns, then collaboration is often better. To optimize both, it appears that people should first work alone and write down their ideas or answers and then pool them with others in a collaborative session. Alternatively, although collaboration can lead to more correct material being recalled, it can also allow the introduction of more incorrect material (e.g., Weldon & Bellinger, 1997; Basden et al., 1997), although this is not always the case (N. K. Clark & Stephenson, 1989). Clearly, much remains to be understood about how ideas are generated and retrieved in the process of collaboration and the impact of collaboration on the ultimate content and structure of the individuals' and groups' memories.

In summary, five experiments were conducted to examine whether groups recall less than their potential because of social loafing and evaluation apprehension in collective work. Overall, the results argue against this explanation and suggest that retrieval interference is the main source of difficulty (Basden et al., 1997). However, the possible contributions of other types of interference and encoding specificity warrant further examination. The study of remembering as a social process promises to extend our understanding of the nature of cognition beyond the limits inherent in considering cognitive processes as the content or activity of only the individual mind.

References


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