



The effects of collaboration on recall of social information

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Three experiments examined the effects of passage type on both individual and collaborative memory performance. In Experiment 1, both individuals and collaborative groups recalled more information from passages containing social information than non-social information. Furthermore, collaborative inhibition (CI) was observed for both types of passages. In Experiment 2, which included a social passage that did not contain gossip, significant main effects of both gossip (gossip > non-gossip) and sociability (explicit > implicit) were observed. As in Experiment 1, CI was observed across all conditions. Experiment 3 separately manipulated gossip and the interest level of the passages and both of these factors enhanced memory performance. Moreover, robust CI was again observed across all conditions. Taken together, the present results demonstrate a mnemonic benefit for social information in individuals and collaborative groups.

The results from a number of recent studies suggest that our memory systems may have evolved to help us remember certain types of information (e.g., Kang, McDermott, & Cohen, 2008; Nairne 2005; Nairne, Pandeirada, & Thompson 2008; Nairne, Thompson, & Pandeirada, 2007; Sharps, Villegas, Nunes, & Barber, 2002; Weinstein, Bugg, & Roediger, 2008). Whereas the majority of these studies have demonstrated enhanced memory in survival scenarios and for adaptively significant stimuli such as animal tracks, a few have considered the potential adaptive importance of remembering social information (e.g., Dunbar, 2007; Mesoudi, Whiten, & Dunbar, 2006; Reysen, 2007; 2009; Reysen & Adair, 2008).

For instance, Mesoudi *et al.* (2006) explored how social and non-social information was transmitted, by way of individual written recall, across sets of four people. Participants read and recalled several paragraphs on topics ranging from the mundane (facts about the city of Denver or a random college student) to the sensational (a

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description of an affair between a college student and her married professor). Although Mesoudi *et al.* (2006) were primarily concerned with the extent to which different types of information would be retained across repeated transmissions, they reported that the 'gossip' text (describing an affair) was better remembered than text passages that were less social in nature (city or person facts). Although it may be tempting to attribute such results to item selection biases, subsequent studies have found that information believed to originate from social sources is both better recalled and better reconstructed than identical information believed to originate from non-social sources (e.g., Reysen, 2009; Reysen & Adair, 2008). Thus, preliminary evidence seems to suggest that social information enjoys a mnemonic advantage over non-social information.

One potential limitation to the generality of these studies, however, is that participants were required to recall while alone (in isolation) whereas, in daily life, social information is commonly shared and remembered collaboratively. Interestingly, despite the frequency of such occurrences, traditional studies on collaborative memory suggest that recalling events in groups often hinders memory performance relative to the combined, non-redundant, output of individuals working alone (e.g., Weldon & Bellinger, 1997). Such collaborative inhibition (CI) has proven robust, having been observed with a wide variety of participants, materials, and procedures (for reviews, see Andersson, Helstrup, & Rönnerberg, 2007; Harris, Paterson, & Kemp, 2008; Thompson, 2008), and is often explained in terms of the strategy disruption hypothesis (e.g., Basden & Basden, 1995; Basden, Basden & Henry, 2000; Blumen & Rajaram, 2008). In short, the strategy disruption explanation suggests that, whereas individuals working alone are free to adopt their preferred retrieval strategy, members of collaborating groups fall prey to repeated disruptions from their group members. To the extent that any two participants working together possess different retrieval strategies, the potential for the disruption of each participant's unique strategy is present throughout the duration of the recall session. Such disruptions are expected to reduce the overall output of collaborative groups relative to the non-redundant pooled output of individuals working alone (i.e., a nominal group).

With regard to collaborative recall of social information, there appear to be two opposing forces - the act of collaboration works to inhibit memory through strategy disruption, whereas the social nature of the information works to enhance memory. Presently, we are faced with a number of intriguing empirical questions: Will collaborative groups show a memory advantage for social information? Will the mnemonic benefits of remembering social information outweigh the mnemonic costs of collaboration or vice versa? Will our expertise with sharing social information reduce, eliminate, or even reverse the negative effects of collaboration, similar to the expertise effects reported by Meade, Nokes, and Morrow (2009; collaborative facilitation when expert pilots recalled material from an aviation scenario)?

In an attempt to address these questions, we conducted three experiments that explored the influence of collaboration on memory for social information. Each experiment employed a common procedure in which participants (1) listened to a series of short paragraphs, (2) engaged in brief distracting activity, and (3) attempted to recall the paragraphs either alone or with a partner. Experiment 1 compared collaborative and nominal group performance using social and non-social passages. Experiment 2 manipulated the presence/absence of gossip and the nature of the social relationship (explicit/implicit). Experiment 3 disentangled the potentially confounding effects of gossip and how interesting the passages were by manipulating these variables directly.

EXPERIMENT 1

In Experiment 1, either one or two participants seated in separate cubicles, read four text passages presented on a computer monitor silently to themselves. Two of the passages contained social information whereas two others did not. All of the passages were short stories with a clear timeline and a causal chain of events. The social passages consisted of details about an affair between a college student and her married college professor and an incident in which a sensitive e-mail between friends became public because of a 'reply-all' error. The non-social passages were composed of stories about a student's encounter with a family of bears while hiking alone and a cicada's journey from underground to a tree where it sheds its skin and flies away.

We expected to replicate previous demonstrations of mnemonic benefits for social information in individuals (e.g., Mesoudi *et al.*, 2006; Reysen, 2009; Reysen & Adair, 2008) using different methods and stimuli and to extend the social processing advantage to include collaborative groups. In addition, we predicted that CI would occur for both non-social passages. However, the prediction for the social passages was less clear. On the one hand, it was possible that any observed mnemonic benefits for social information would not be enough to counter the deleterious effects of collaboration - after all, only a scant few reports have shown attenuation of this effect (e.g., Meade *et al.*, 2009; Takahashi & Saito, 2004; Thorley & Dewhurst, 2007). On the other hand, it was possible that collaborators would suffer from less strategy disruption when jointly recalling social information because humans are experts in sharing social information and Meade *et al.* (2009) showed collaborative facilitation when experts recalled together. If this is the case, then one might expect a reduction, elimination, or even reversal of CI for the social passages.

Method

Participants

Eighty psychology students from the University of Mississippi participated in partial fulfillment of course requirements. Participants arrived at the laboratory either alone (40 individuals) or in pairs (20 pairs) depending on whether they were assigned to the individual recall condition or the collaborative recall condition and they were tested in sessions lasting approximately 20 min.

Design and materials

A 2 (group size: 1 vs. 2) × 2 (passage type: social vs. non-social) mixed factor design was utilized with group size manipulated between-subjects and passage type manipulated within-subjects. Four paragraphs - two social and two non-social - of approximately equal length (7-8 sentences; 122-126 words; 23 propositions) were created for Experiment 1 (see Appendix). Propositions were formed using Kintsch (1974). The social passages described the interactions of at least two people, specifically (1) an affair between a student and professor and (2) a 'reply-all' mishap in which a student vents about a professor to a classmate but inadvertently sends the e-mail to entire class and professor. The non-social passages failed to describe any interactions among people, specifically, (1) a student's experience while hiking alone in the woods and (2) an insect's experience as it emerges from its underground home and transforms into a winged cicada.

Using a 4×4 Latin Square, paragraphs were assigned in blocks of four to a presentation order. The row orderings of this same Latin Square were randomized across blocks of paragraphs. Paragraphs, then, were guaranteed to occur first equally often as second, etc. Participants were unaware of the order in which the paragraphs would be presented to them. Paragraphs were displayed successively on a computer screen and recall was recorded by the experimenter in a Microsoft Word document that had the character names above a blank space for typing for each of the four paragraphs. A stopwatch was used to measure the allocated recall time period and distracter task time. A sheet of 80 simple math problems (addition and subtraction) was used for the distracter task.

Procedure

Participants assigned to the individual recall condition completed the experiment in a room with the experimenter whereas participants assigned to the collaborative recall condition completed the experiment in a room with one other participant and the experimenter. The participants sat in separate cubicles containing personal computers on either side of the experimenter who was seated between the participants in a third cubicle containing a personal computer.

Each trial began with participants reading and signing a consent form. Following this, the instructions were presented on all three monitors and the participants were asked to read the instructions silently while the experimenter read them aloud. The instructions informed the participants that they would be asked to silently read several paragraphs on their individual monitors. The participants were also told that they would be asked to complete some simple math problems before recalling the paragraphs. At this point, the experimenter asked the participants if they had any questions before the experiment continued. All paragraphs were displayed for 50 s each, during which time the participants read the passages silently to themselves. After all four paragraphs had been presented, participants completed a 90-s distracting activity in which they were given two pages of addition and subtraction problems and were asked to solve as many as possible.

Next, participants were told it was time for the memory test. They were instructed to tell the experimenter everything they could remember from the paragraph about a specific character or topic. For the collaborative groups, a 'free flowing' recall method was employed in an attempt to simulate the manner in which people typically work together to recall events as closely as possible. More specifically, instead of using an artificial recall method, like a 'turn-taking' strategy in which participants are forced to take turns responding, participants in the collaborative condition were simply asked to work together to remember as much as they could from each text passage. No further instructions were provided. The experimenter typed as the participant(s) talked. Pilot testing showed that, without exception, individuals and groups completed their recall in less than 2 min so participants were given 2 min to recall as much as possible from each of the four paragraphs. When the 2 min had expired, the experimenter scrolled to the name of the next character/topic and the process was repeated. Following the completion of recall for all four paragraphs, participants were debriefed and thanked for their participation.

Data analysis

Two independent raters, blind to the experiment's hypotheses, assessed recall performance by determining which of the 23 propositions in each paragraph were

accurately remembered. Raters used lenient scoring criteria in which participants were awarded credit if they recalled the general idea of the proposition. After each paragraph, the raters discussed their assessment and, in the event of an inconsistent rating, they continued the discussion until consensus was achieved. Raters kept a list of 'acceptable phrases' to ensure consistent scoring of propositions throughout the process.

The hypotheses of interest required comparisons of (1) collaborative memory performance across passages to determine whether the mnemonic benefit of social information extends to group recall and (2) collaborative and nominal group performance across passages to assess the presence or absence of CI. Therefore, we used a 2 (group type: collaborative vs. nominal) \times 2 (passage type: social vs. non-social) mixed factor analysis of variance (ANOVA). In other words, for each group type, average performance was calculated for the two social passages/trials and the two non-social passages/trials. Representative nominal groups were formed using the procedure outlined by Kelley and Wright (2010), which involved using their computer program to sample thousands of sets of nominal groups in an effort to obtain representative nominal group statistics (i.e., overall mean and variance) from which the one set of nominal groups that most resembles the overall statistics was obtained. Given the hypotheses, the individual data (group size 1) was only important in that it allowed the creation of nominal groups. However, for the sake of completeness, overall means for the individual conditions are reported as a note in the description of Figure 1.

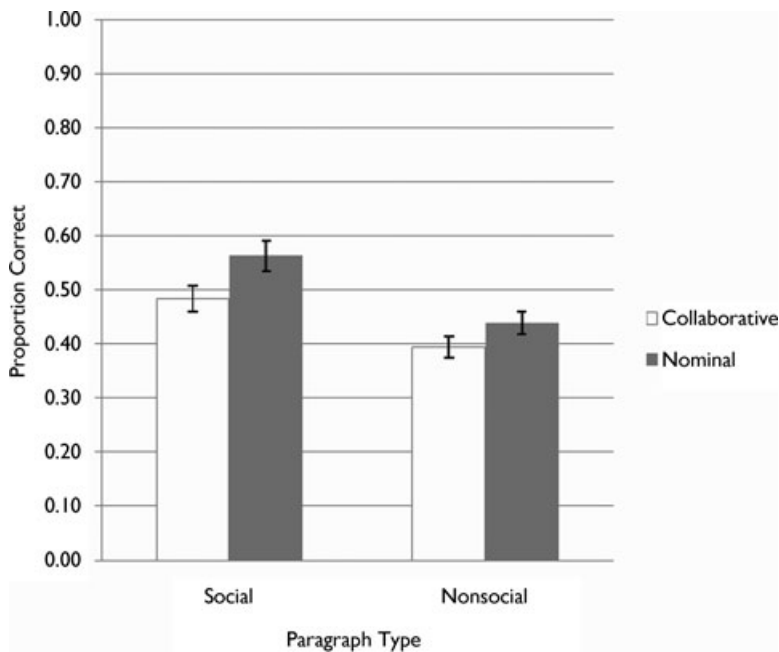


Figure 1. Proportion of correctly recalled propositions as a function of paragraph type (social vs. non-social) for collaborative and nominal groups in Experiment 1. *Note.* Individual means: .38 and .25 for the social and non-social, respectively.

Results and discussion

Figure 1 displays the proportions of correctly recalled propositions as a function of type of group (collaborative vs. nominal) and type of passage (social vs. non-social). The 2×2 mixed ANOVA revealed a main effect of passage type, $F(1,38) = 39.69, p < .001$. Thus, as predicted, overall recall of the social passages exceeded that of the non-social passages. In addition, a statistically significant main effect of group type was observed, $F(1,38) = 7.87, p < .01$, which reflects an overall effect of CI (nominal > collaborative). The group type \times passage type interaction was not statistically significant ($F < 1$). These data support our first two hypotheses – social passages were recalled better than non-social passages and CI was present for non-social passages. Interestingly, CI was evident for the social passages as well, which suggests that the mnemonic benefit of social information was not enough to counteract the negative effects of collaboration.

After visually inspecting recall performance for each of the four individual passages, we noticed that the two non-social paragraphs seemed to yield different levels of recall. A paired-samples *t*-test revealed a significant difference between the non-social/hiking (.45) and the non-social/cicada (.38) passages, $t(39) = 2.91, p < .01$. We reasoned that the non-social/hiking paragraph might have contained implicit social information because it described the actions of a person, whereas such implicit social information was not present in the non-social/cicada paragraph. Overall, the results of Experiment 1 were clear. We replicated prior observations of a mnemonic benefit for social information in individuals using different methods and stimuli and observed a similar effect in collaborative groups. Furthermore, the negative effects of CI were found to influence recall performance regardless of the type of passage participants were asked to remember.

EXPERIMENT 2

Experiment 2 was designed to replicate and extend Experiment 1 while eliminating concerns about potential confounds in the experimental stimuli. Four new paragraphs were created that allowed us to factorially compare the mnemonic effects of the type of social information (gossip vs. non-gossip) and the nature of the social relationship (explicit vs. implicit) within the context of collaborative memory. For the purpose of the present study, gossip was defined as information pertaining to particularly intense social interactions, especially information that could influence the reputation or status of the person in question (McAndrew, Bell, & Garcia, 2007; Mesoudi *et al.*, 2006). Gossip paragraphs attempted to control the type of gossip by describing one of two types of cheating (on a spouse vs. on a test), whereas non-gossip paragraphs described sets of specific events (day in the life of a college student vs. recreational tennis players). In explicitly social passages, characters were described as directly interacting with one another, whereas the implicitly social passages did not contain direct interactions, but participants potentially could infer how the character might interact with others. Given the general findings reported in Experiment 1, we expected a main effect of gossip (gossip > non-gossip) and a main effect of group type (nominal > collaborative).

Method

Participants

Sixty-four psychology students from the University of Mississippi and Lake Forest College participated in partial fulfillment of course requirements. Participants arrived at the

laboratory either alone (32 individuals) or in pairs (16 pairs) depending on whether they were assigned to the individual recall condition or the collaborative recall condition and they were tested in sessions lasting approximately 20 min.

Materials and design

A 2 (group size: 1 vs. 2) \times 2 (information type: gossip vs. non-gossip) \times 2 (sociality: implicit vs. explicit) mixed factor design with information type and sociality as within-subject variables was employed. Four new paragraphs of approximately equal length (115–120 words) containing nine sentences and 19 propositions were used (see Appendix). The paragraphs of implicit sociality contained only one character whereas the paragraphs of explicit sociality contained more than one character. This manipulation allowed us to measure possible differences between recalling a paragraph in which the character interactions were clearly described versus recalling a paragraph in which the character's social relationships are only implied. In the paragraph describing someone cheating in school, for instance, one may infer that character would be untrustworthy in social interactions whereas in the paragraph of multi-person cheating, one can overtly see that the character is untrustworthy. As in Experiment 1, all paragraphs had a story structure in which a logical order of events took place. We controlled the gossip paragraphs so that each contained text about characters engaged in some sort of cheating. Non-gossip paragraphs contained text about one specific instance of a daily routine.

In an attempt to determine whether we appropriately manipulated gossip and sociality, 20 participants read all four paragraphs and were asked (1) to judge whether they considered the paragraphs to be gossip (yes or no) and (2) to rate how clearly the paragraph described the main character's interactions (1 = very unclear; 5 = very clearly). Of the 20 participants, 20 and 17 people considered the affair-cheating and academic-cheating passages to be gossip, respectively, whereas only one person rated each of the non-gossip passages to be gossip. Participants rated the explicitly social paragraphs as higher in sociality (4.35 and 4.10 for gossip and non-gossip) than the implicitly social paragraphs (2.75 and 2.25 for gossip and non-gossip). The materials related to the distracting activity, recall sheets, and timing were similar to those used in Experiment 1.

Procedure

The procedure was modelled after the procedure used in Experiment 1.

Data analysis

The procedures for rating propositions and creating of nominal groups were identical to those reported in Experiment 1. Similarly, we employed a 2 (group type: collaborative vs. nominal) \times 2 (information type: gossip vs. non-gossip) \times 2 (sociality: explicit vs. implicit) mixed factor ANOVA in this study.

Results

Figure 2 displays the proportions of correctly recalled propositions as a function of type of group (collaborative vs. nominal), type of information (gossip vs. non-gossip), and sociality (explicit vs. implicit). The 2 \times 2 \times 2 mixed ANOVA revealed a reliable main effect of information type, $F(1,30) = 29.56, p < .001$, which illustrates that overall

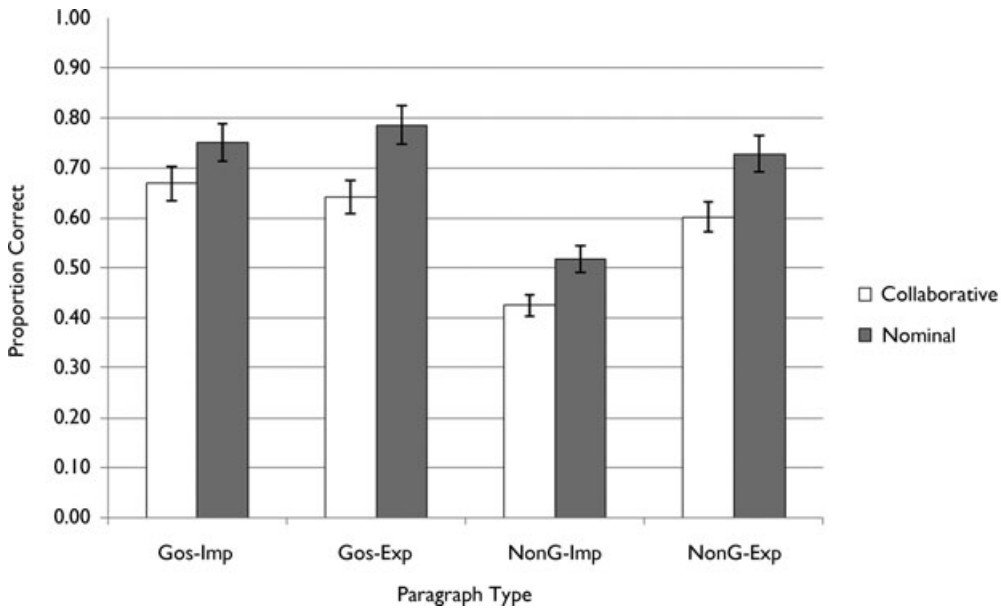


Figure 2. Proportion of correctly recalled propositions as a function of information type [gossip (Gos) vs. non-gossip (NonG)] and sociality [implicit (Imp) vs. explicit (Exp)] for collaborative and nominal groups in Experiment 2. *Note.* Individual means: .56, .58, .33, and .48 for gossip implicit, gossip explicit, non-gossip implicit, and non-gossip explicit paragraphs, respectively.

recall of the gossip passages exceeded that of the non-gossip passages. The main effect of sociality also reached statistical significance, $F(1,30) = 19.82, p < .001$, and shows generally superior memory for explicitly, as compared to implicitly, social material. Furthermore, a statistically significant main effect of group type was also observed, $F(1,30) = 7.39, p < .05$, which reflects an overall effect of CI (nominal > collaborative). Only the information type \times sociality interaction was significant, $F(1,30) = 22.19, p < .001$. Newman-Keuls *post hoc* comparisons confirmed that this interaction arose from the fact that memory was poorest across groups for the implicit non-gossip paragraph.

Overall, considering the main effects of type of information and sociality, the results obtained in Experiment 2 seem to suggest that not all social information is mnemonically equivalent. More specifically, explicitly social information and gossip were remembered better than implicitly social information and social non-gossip, respectively. Of course, these findings could be the result of a potential confounding factor: the interest level of the passages. That is, the explicitly social and gossip paragraphs might simply have been more interesting than the other paragraphs, which promoted better memory. Experiment 3 was designed to examine these potential issues in greater detail.

With regard to the effects of collaboration on recall of social information, the results obtained in Experiment 2 both replicate and extend those described in Experiment 1. The influence of collaboration on memory for social information was quite clear in the present study – robust CI occurred in each experimental condition. Evidently, the mnemonic benefits of social information are no match for the deleterious effects of CI.

EXPERIMENT 3

The goal of Experiment 3 was to disentangle the potentially confounding factors of gossip and interest from Experiment 2 by manipulating these variables directly. After pilot testing 12 paragraphs and gathering ratings of interest and gossip, four new paragraphs were chosen that fell into the following categories: high-interest gossip, high-interest non-gossip, low-interest gossip, low-interest non-gossip (see Appendix). The pre-test ratings suggested that these variables are separable – that is, not all gossip is interesting and interesting material need not contain gossip. As in the previous studies, participants heard and read the paragraphs, completed a brief distracting activity, and recalled the passages either alone or with a partner. We had two primary predictions for Experiment 3. First, we expected to obtain main effects for information type (gossip > non-gossip), as seen in Experiment 2, and interest level (high > low), as seen in previous studies (e.g., Wade & Adams, 1990). Second, given the strong evidence of CI in both Experiments 1 and 2, we expected to observe CI across all four conditions in Experiment 3.

Method

Participants

Sixty psychology students from the University of Mississippi and Lake Forest College participated in partial fulfillment of course requirements. Participants arrived at the laboratory either alone (40 individuals) or in pairs (20 pairs) depending on whether they were assigned to the individual recall condition or the collaborative recall condition and they were tested in sessions lasting approximately 20 min.

Materials and design

The experiment used four original paragraphs. Each paragraph contained between 122 and 126 words, was either eight or nine sentences long, and contained 22 propositions. Sociability was explicit (three interacting characters) and was held constant across paragraphs. A 2 (group size: 1 vs. 2) \times 2 (information type: gossip vs. non-gossip) \times 2 (interest level: high vs. low) mixed factor design was used. Gossip type and interest level were manipulated within-subjects such that there were paragraphs for high-interest gossip, high-interest non-gossip, low-interest gossip, and low-interest non-gossip.

As in Experiment 2, gossip paragraphs described acts of cheating whereas non-gossip passages described a set of events in daily life. To vary interest, we employed the suggestion of Silvia (2008) who showed that participants are more interested in stories about people in their age group than in other age groups. Hence, high-interest paragraphs involved college students, whereas low-interest passages involved middle-aged or elderly people. Prior to Experiment 3, 12 paragraphs were created – three for each of the four combinations of interest and gossip. Twenty-five participants were asked to rate the level of interest of each paragraph on a 1–7 scale (1 = very uninteresting; 7 = very interesting) and to judge whether they considered the paragraph to be gossip (yes or no). Four paragraphs were selected for use in Experiment 3. The two high-interest paragraphs (gossip and non-gossip) yielded mean interest ratings of 5.42 and 5.35, respectively. Of the 25 participants, all rated the gossip paragraph as being gossip, and only four rated the non-gossip paragraph as gossip. The two low-interest paragraphs (gossip and non-gossip) produced mean interest ratings of 3.05 and 3.00, respectively. Of the 25 participants, 22 considered the gossip passage to be gossip, and two rated the

non-gossip passage as gossip. These ratings indicated that we were able to manipulate interest and gossip independently.

The high-interest gossip passage described a college student discovering that her boyfriend was cheating on her with her best friend, whereas the low-interest gossip paragraph described a cheating scandal in a retirement home. The high-interest non-gossip passage was about a college student getting stuck in an elevator with Oprah Winfrey, whereas the uninteresting non-gossip paragraph described a shoe salesman and his trip home from work one day in the rain. As in Experiment 2, a 4×4 Latin Square design was used during the presentation stage. Recall was recorded in a file that for each paragraph had the main characters' names above a blank space for typing. All other design details were consistent with Experiment 2.

Procedure

All procedural details were identical to those used in Experiment 2.

Data analysis

All analyses were identical to those used in Experiment 2, with the exception that we employed a 2 (group type: collaborative vs. nominal) \times 2 (information type: gossip vs. non-gossip) \times 2 (interest level: high vs. low) mixed factor ANOVA.

Results

Figure 3 displays the proportions of correctly recalled propositions as a function of type of group (collaborative vs. nominal), type of information (gossip vs. non-gossip), and interest level (high vs. low). The $2 \times 2 \times 2$ mixed ANOVA revealed a main effect

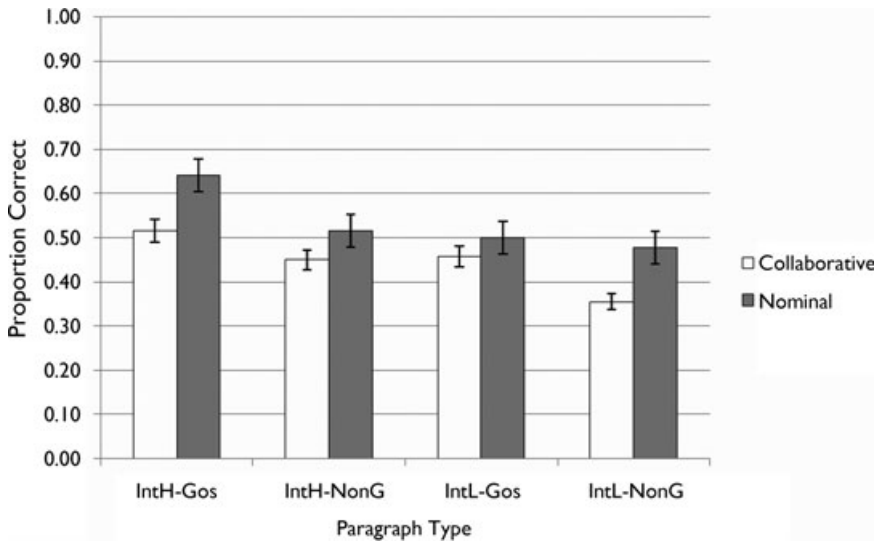


Figure 3. Proportion of correctly recalled propositions as a function of interest level [high (IntH) vs. low (IntL)] and information type [gossip (Gos) vs. non-gossip (NonG)] for collaborative and nominal groups in Experiment 3. Note. Individual means: .42, .36, .33, and .24 for high-interest gossip, high-interest non-gossip, low-interest gossip, and low-interest non-gossip paragraphs, respectively.

of information type, $F(1,38) = 14.39$, $p < .001$, which illustrates that overall recall of the gossip passages exceeded that of the non-gossip passages. The main effect of level of interest also reached statistical significance, $F(1,38) = 14.88$, $p < .001$, and shows generally superior memory for highly interesting social material. In addition, a statistically significant main effect of group type was observed, $F(1,38) = 7.94$, $p < .01$, which reflects an overall effect of CI (nominal > collaborative). None of the interactions were statistically significant.

Consistent with Experiment 2, CI was evident across all paragraphs and gossip material was better remembered than non-gossip. Moreover, consistent with past research on interest (e.g., Wade & Adams, 1990), memory for high-interest material exceeded that of low-interest material. It appears, then, that the mnemonic benefits of interest and gossip are separable and both enhance performance. Neither benefit, however, is of sufficient strength to counteract the negative effects of collaboration. Of course, our conclusions about interest are potentially limited because we narrowly defined interest by using Silvia's (2008) suggestion that people are more interested in stories about similar aged people. Interest, certainly, is a complex phenomenon that reflects more than an age-similarity bias and further work on the matter might be warranted. Still, we are comforted by the fact that when pilot participants were asked to rate their level of 'interest' in these passages, they reliably distinguished between high- and low-interest passages.

Discussion

The present study had two primary purposes. First, prior research (e.g., Mesoudi *et al.*, 2006) indicated that individuals are more likely to remember social information than non-social information. We hoped to determine whether this observation could be extended to collaborative groups. Second, we were also interested in examining whether CI, or the tendency for collaborating groups to remember less than an equal number of individuals, would occur in dyads recalling social information.

Given that CI has been observed in a wide range of situations using a variety of experimental stimuli, one might suspect that CI would extend to information describing social interactions. On the other hand, if participants inherently adopt similar retrieval strategies when recalling gossip, then recalling such information in groups might mitigate the deleterious effects of CI. In Experiment 1, we compared collaborative and nominal group recall performance for two social passages and two non-social passages. We showed a mnemonic benefit for social information (social > non-social) and robust CI for all passages. Our conclusions, however, were limited by some potential confounds in the paragraphs.

In attempt to replicate and extend those observations, in Experiment 2, we manipulated both the manner in which the social interactions in the passages were described (explicit vs. implicit) and whether they contained gossip or not. Once again, we found robust CI across all experimental conditions, along with reliable benefits of gossip and explicit sociality on memory. Although Experiments 1 and 2 showed mnemonic advantages for social and gossip information, respectively, we could not rule out the possibility that the level of interest in the paragraphs was driving the observed effects. To examine such a possibility, both gossip and interest were manipulated as separate factors in Experiment 3. As in both prior experiments, social information was remembered better than non-social information regardless of whether participants worked alone or in groups. Furthermore, CI was observed in all of the conditions examined. With respect to

the interest level of the passages, interesting information was remembered better than less-interesting information, but it was still remembered less well than gossip. Moreover, neither remembering gossip nor interesting information was sufficient to eliminate CI.

Taken as a whole, the present experiments suggest several conclusions. First, information that is more social in nature seems to be better recalled than information that is less social in nature and this observation can be extended from previous studies in which participants recall alone to situations where they work with another participant to recall information. More generally, it may be the case that such findings result from the fact that social information is often important to survival. Given this, our memory systems may be predisposed to encoding, storing, and retrieving social information. However, despite the fact that social information was recalled better than non-social information in both individuals and groups, working with another participant to recall highly interesting social information was still insufficient to eliminate the negative effects of CI. In that regard, our results are consistent with the strategy disruption hypothesis, or the idea that recall from one participant can disrupt another participant's retrieval strategy, thereby reducing the overall levels of recall in collaborative groups relative to nominal groups.

As noted above, people spend a great deal of time recalling information in groups and, given this fact, might be considered 'experts' at remembering social information. Furthermore, Meade *et al.* (2009) showed collaborative facilitation when experts recalled together. So by extension, do our results imply that humans are not experts at recalling social information? We suspect not. First of all, in every situation in which social information was pitted against non-social information, participants recalled more social information than non-social information, both individually and in groups. Second, we also observed that some types of social information are remembered better than others. Perhaps most tellingly, the type of social information that seems especially relevant from a fitness perspective, highly interesting gossip involving cheating, is the same type of information that led to the best memory performance.

One potential explanation for the CI observed in the present experiments is that although each individual member of a group may have remembered more information from the social paragraphs than the non-social ones, they did not utilize similar retrieval strategies while recalling them. If participants opted for different retrieval strategies at the point of test, one might actually predict more CI for highly interesting gossip than other information. According to such a prediction, if participants do not share a retrieval strategy and every item recalled offers the potential for disruption, then it follows that more disruption would be expected in conditions in which participants are recalling more information.

As such, our results do not take us a step closer to understanding why people work with others to remember information so frequently when it appears to be a less than optimal retrieval strategy. Perhaps one answer to this question is that although nominal groups are often found to outperform collaborative groups, collaborative groups tend to remember more than participants working alone. In other words, unless you and a friend were attempting to remember something together, and you decided to do so by separately recalling everything you could and then pooling your combined output, you would still be better off working together than individually. When viewed in such a manner, collaboration could be conceived as providing a net advantage over individual recall. Thus, from a functionalist perspective, collaboration would confer a mnemonic advantage to those who were predisposed towards remembering together as opposed to those who preferred working in isolation.

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Appendix

Experiment 1 passages

Social version 1

Nancy is a college freshman who was having an affair with her married college professor. Although she had been sleeping with the professor for several months, she lied to her friends by saying she was volunteering at a hospital when she was really with him. Yesterday, Nancy took a home pregnancy test and discovered that she was pregnant with his child. She was shocked because the professor told her it was medically impossible to have children. She went to his office and told him about the pregnancy. The professor laughed at her, called her a foolish girl, and said he never wanted to see her again. Nancy left the office in tears and drove straight to the professor's home and told his wife about the pregnancy.

Social version 2

Dan is an economics major and had a statistics class taught by the department head. On the first day, the instructor assigned a problem set and said it would take about 4 hr to complete. Although Dan is great at math, he needed 10 hr on a Saturday to complete the assignment. When Dan checked his e-mail that evening, his instructor assigned an additional problem set. Dan was upset and vented his frustration by writing an e-mail to his classmate Jim. He wrote that the instructor was a 'sadistic moron who isn't even qualified to teach kindergarten'. Dan realized too late that he mistakenly hit 'reply all' instead of sending the message only to Jim. The entire class and the instructor received Dan's e-mail.

Non-social version 1

After her college graduation, Maria went camping in a national forest. On a morning hike, she followed a narrow trail to a bluff overlooking the river. About 20 min into her hike, she spotted a family of bears directly ahead of her on the trail. The bears noticed Maria as well and they moved in her direction. Maria knew that she could not outrun the mother bear, so she pulled out a bottle of pepper spray from her backpack and started slowly walking backwards down the trail. The bears matched Maria's pace for about a

half mile until the mother bear reversed her direction and disappeared into the forest with her cubs. Maria fell to her knees and breathed a deep sigh of relief.

Non-social version 2

After living underground for 17 years, the cicada sensed it was time to dig its way to the surface. The cicada ate one last mouthful of tree sap and began tunnelling upward. Minutes later, sunlight shone on cicada for the first time as it rested between some blades of grass. The cicada searched for the nearest tree and crawled to it. It climbed 2 feet up the tree and dug its legs into the bark so it would not fall. As it warmed in the sun, the cicada pumped fluids through its body, which cracked its outer shell and allowed its wings to move freely. It quickly escaped its shell and flew to a high tree branch where it began clicking loudly.

Experiment 2 passages

Gossip implicit

Annie was a straight-A student for all four of her years at Brown. She was often praised by faculty and admired by her classmates for her hard work. She had always dreamed of becoming a doctor and was in the process of applying to medical schools. Her top choice was Johns Hopkins. Everyone who knew her predicted that she would have a bright future. While taking her last final exam of her senior year, Annie was caught cheating. Later, under pressure, she admitted to having cheated throughout her college career. She had plagiarized most of her papers and copied from hidden notes during exams. Annie was expelled from her college a few weeks before graduating.

Non-gossip implicit

Rebecca wakes up every Monday at 8:00. She takes a shower and spends quite a bit of time choosing her outfit. Once she is ready, she goes to the cafeteria for breakfast. She does not like to eat a lot in the morning, so she usually has a bowl of cereal. Rebecca's first class is Spanish, followed by a long history lecture. During lunch, she usually drives off campus and goes to Sonic or Chipotle. She returns just in time for her afternoon class, where she occasionally falls asleep. At night, she goes back to her room to do her homework, and when she is done, she likes to relax with a good book. She goes to bed early so that she will be well rested for the next day.

Gossip explicit

Jack and Kristen are seniors in college who have been dating for 2 years. Two months ago, Jack proposed and Kristen happily said yes. They are planning to rent an apartment in downtown Chicago next year. However, Kristen does not know that Jack has another girlfriend on the side, Ashley. Jack and Ashley have been seeing each other secretly for 5 months. A few days ago, Jack found out that Ashley was 2 months pregnant with his child. Since finding out about the pregnancy, Jack does not want to see Ashley anymore. He is not answering her phone calls, and he is avoiding places he expects to see her. Ashley has become desperate and is threatening to tell Kristen about their affair.

Non-gossip explicit

Yesterday, Marco and Danielle decided to take up tennis as a new hobby. They have agreed to meet on Wednesdays and Fridays to play for 2 hr. Today, they played for the first time. Even though neither of them has ever had tennis lessons, they both played well. They spent the first hour warming up and the second playing a match, which Marco won. After the match, Marco and Danielle went to Marco's house to watch their favourite tennis tournament, the US Open. They watch it every August and cheer for their favourite players. Marco supports Roger Federer, and Danielle admires Carlos Moya. After they watched for an hour, Danielle went home to eat dinner with her family.

Experiment 3 passages

High-interest gossip

Maria and Zack are college students and have been dating for 3 years. Maria frequently shares her feelings about Zack with her best friend of 10 years, Katie. She even told Katie that she often daydreams about the day Zack will ask for her hand in marriage. Disappointed one evening when Zack had to cancel on a date, Maria decided to stop by Katie's dorm room. As usual, she walked in without knocking and was greeted by the sight of Zack and Katie together in bed without any clothes on. Zack jumped up and tried to explain, but Maria did not want to hear it. Feeling betrayed, Maria threw a book at them, slammed the door, and ran all the way back to her dorm room.

High-interest non-gossip

Maggie, who is a junior in college, won a weekend stay in a luxury hotel. At check-in, she was given keys to a penthouse room and a private elevator. When Maggie used the elevator, the doors opened and she was surprised to see Oprah Winfrey standing inside. Soon after the doors closed, the elevator came to a sudden stop between floors. They were stuck. Maggie and Oprah spent the next 3 hr chatting and became fast friends. Oprah invited Maggie to be the special guest announcer on her show the next day and offered her a summer internship. After the show, Maggie got the chance to join Oprah and her guest, Matt Damon, for drinks and a long dinner at a five-star restaurant.

Low-interest gossip

Every Tuesday at the retirement home, residents have the opportunity to participate in bingo night. Nancy, an 87-year-old woman, eagerly anticipates this event each week. One night, however, Nancy refused to attend bingo night, which was particularly surprising to Melissa, the nurse who runs the event. Nancy was upset and stated that other residents cheat at bingo so there was no point in going. She said that Duncan secretly cheats by playing with two cards, even though the rules clearly state only one card is allowed. Nancy told Melissa not to be fooled by Duncan's innocent appearance and not to believe his lies. Melissa promised to keep a close eye on Duncan if Nancy would give bingo another try, so Nancy reluctantly attended.

Low-interest non-gossip

Mike is in his mid-50s and has worked as a shoe salesman for the past 28 years. He has a receding hairline and wrinkled eyes. He normally walks to and from work but today

the weather forced him to take the bus home. Juan, the local weatherman, predicted sun and clear skies so Mike was unprepared for the downpour of rain that afternoon. Without his umbrella or rain jacket, Mike was soaked by the time he got to the bus stop. Fortunately, his friend Ted was already waiting at the bus stop with an umbrella. Ted and Mike shared the umbrella until the bus arrived. Mike was eager to get home because he did not want to miss his favourite television show.