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Remembering stories together: Social contagion and the moderating influence of disagreements in conversations☆

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ABSTRACT

Although remembering often occurs with conversations, the effects of its pragmatics on memory are rarely examined. We studied the effect of two pragmatic factors: (1) the presence of disagreeing and (2) the level of participation in the disagreement. In the present study, each participant read a slightly different version of four stories, thereby allowing for the possibility of social contagion through the conversation. They then jointly recounted the stories. We coded for the presence or absence of disagreements, and whether a participant contributed to the disagreement. Three factors mediated social contagion: (a) the presence or absence of an overt disagreement; (b) whether or not a member of a conversational remembering participated actively in a disagreement; and (c) how well participants remembered the original material. Both the pragmatics of conversations and quality of memory are important factors moderating social contagion.

Remembering has often been viewed as a discursive process (Hirst & Echterhoff, 2012; Middleton & Edwards, 1990; van Dijk, 1997). When remembering is a collaborative effort, as it often is, the discourse becomes a dialog, in which the process of remembering is distributed across multiple individuals (Blumen, Rajaram, & Henkel, 2013; Rajaram & Pererira-Pasarin, 2010; Sutton, Harris, Keil, & Barnier, 2010). One person in a conversation, for instance, might recollect a past event, which might evoke from another conversational participant a follow-up memory. When remembering is treated in this manner, its study becomes more than an analysis of internal retrieval processes and external retrieval cues. The cognitive pragmatics shaping the collaborative effort also matter (Bietti, 2012).

The collaborative effort involved in conversational remembering allows what one person in the conversation recounts to serve as a source for *updating* the memories of the other participants. We use as our theoretical framework for studying such updating Zwaan and Radvansky's (1998) situational model. In discussions of text comprehension, those employing situation models treat each piece of text as an instruction about how to construct a model of the content of the text. For collaborative remembering, each utterance can also be viewed as an instruction about how to construct a model or representation of the past. This instruction is not only for the rememberers themselves, but for all participants. *Updating* occurs when each new utterance in a group recounting is interpreted and incorporated into an evolving model each person possesses of the to-be-recounted event. This evolving model becomes the long-term memory that guides subsequent remembering.

Two qualifications are needed: First, when people remember collaboratively, they are remembering a shared past and hence begin the process of remembering with an extant model, their existing memory. Unlike readers comprehending text, then, collaborative rememberers are not building a model from scratch, rather they are building on an already established model. Each participant in the collaborative effort may have a different model. The act of collaborative remembering involves bringing to mind elements of the extant models and, then, as a result of what is remembered by the group, updating each member's respective model.

Second, the utterances in collaborative remembering may include not just recollections, but also what Middleton and Edwards (1990) called discourse practices, such as metamemory comments and comments about how to proceed with the remembering, such as, "may be should try a little harder." These discourse practices can also be viewed as updating instructions.

We focus our concerns here on those instances in which updating leads to implanting misleading information into the evolving mnemonic models of conversational participants (Gabbert, Memon, Allan, & Wright, 2004; Loftus, 1975; Meade & Roediger,

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2002; Wright, Memon, Skagerberg, & Gabbert, 2009). Following Meade and Roediger (2002), we will refer to this updating as *social contagion*. From a situation model perspective, an utterance of misleading information by one participant in an act of conversational remembering can lead other participants to update their model with this misinformation. We are concerned here with the pragmatics underlying this updating. Just as pragmatics can affect how readers update their models of a passage of text, so also might pragmatics affect how participants in an act of collaborative remembering update their integrated model with "misleading" information (Allan, Midjord, Martin, & Gabbert, 2012).

At least two pragmatic features might affect the degree to which an evolving representation is updated with misleading information. The first is one of Middleton and Edwards's (1990) discourse practices: *disagreements*. While it is a common practice for collaborative participants to overtly disagree with a recollection of another participant within a conversation, the effect of these disagreements on subsequent memory has not been studied in depth (but see Walther et al., 2002). Nevertheless, with at least one caveat, we would expect that disagreement should act as a warning to participants. The effect of warnings on social contagion has been extensively investigated, usually in studies in which an experimenter warns all but one of the participants, for instance, of one participant's poor memory (Hirst & Echterhoff, 2012; Meade & Roediger, 2002; Wright et al., 2009). The extant research suggests that warnings, and we are claiming here, disagreements, diminish the level of social contagion when participants have a good memory of the original material. They can actually increase the level of social contagion if participants' memory is poor (Muller & Hirst, 2010). Warnings – and by extension, disagreements – might be construed as instructions to participants not to update the evolving mnemonic model, or at least to do so cautiously. In order to comply with this instruction, participants might make an effort to monitor the accuracy of what other participants recount. When the participants' memory is good, the increased monitoring should increase the chance of distinguishing accurate from inaccurate memories and hence decrease the level of social contagion (Johnson, Hashtroudi, & Lindsay, 1993). On the other hand, when participants possess a poor memory, they may still attend carefully to what their untrustworthy colleague recollected, as instructed, but may now find it difficult to distinguish accurate from inaccurate memories. Consequently, they may unintentionally incorporate some of what their colleague says into their model, despite the warning, or, we assert, the disagreement.

Our one caveat to this account involves the second pragmatic factor we want to consider: *Participation*. Schober and Clark (1989) distinguished between *active participants* in a conversation and *overhearers*, that is, those who merely listen to others converse. They found that overhearers were less likely to comprehend what was being said than active participants. To state their findings in terms of situation models, if each utterance is viewed as an instruction, then participation affects the effectiveness of the instructions. Of course, in the case of Schober and Clark, the effect was on comprehension. Here we are interested in the way disagreements and participation might interact to affect the likelihood of social contagion. Will active participants in a disagreement treat misleading information differently from overhearers – participants who merely listen to the disagreement, without actively taking part in it?

An answer to the just posed question may again depend on the quality of participants' memory. On the one hand, if the listeners' memory for the original material is good, then they should be able to successfully identify the contested item as accurate or not and, in the presence of a disagreement, avoid incorporating new information into their evolving model. In such an instance, it should not matter whether listeners are active participants in a disagreement or overhearers. On the other hand, if the listeners' memory for the original material is poor, they may find it difficult to discriminate accurate from inaccurate recollections, even when carefully attending to a speaker's recollections. For the overhearer, the situation is similar to the role of warnings described by Muller and Hirst (2010). As a result, disagreements observed by memory-impoverished overhearers should leave the level of social contagion unaffected, or even increase it. As for memory-impoverished actively participating listeners, they are clearly generating alternative recollections, or at least actively noting to themselves that the speaker's recollection is potentially wrong. Their overt commitment to the potential inaccuracy of another participant's memory might lead them to identify a speaker's recollection as "new" and, as a result, they may be less likely to evidence the effects of social contagion (see Walther et al., 2002, for a similar claim).

Thus, we predict:

(1) When listeners have a good memory for the original material, disagreements should diminish social contagion, regardless of whether listeners are active participants or overhearers.
(2) When listeners have a poor memory, disagreements should diminish social contagion only if listeners actively participate in the disagreements. If they are overhearers, the disagreements should have no effect or actually increase the level of social contagion.

We tested these predictions, using a methodology similar to Muller and Hirst (2010). Following a procedure developed by Bransford and Johnson (1973), Muller and Hirst manipulated memorability by presenting stories with or without a contexualizing picture. The stories were difficult to understand without the pictures and hence, without the pictures, were not memorable. Unlike Muller and Hirst, we did not supply any warnings. Rather we allowed disagreements in collaborative acts of remembering to emerge spontaneously.

1. Method

1.1. Participants

Eighty students from Universidad de Belgrano participated in the study for course credit. Participants were divided in 20 groups of 4 members each. Each member of the group was unknown to one another. 76% of the participants were female; the mean age of the sample was 26.0 years ($SD = 4.2$).

1.2. Materials

The material was similar to that employed in Muller and Hirst (2010). The four short stories averaged 127 words (range: 117–133 words) and were written so that an accompanying picture made them easier to understand and hence memorize (see Fig. 1). Three were of our own devising; the fourth was a Spanish translation of a story found in Bransford and Johnson (1973).

We devised four versions of each story by changing specific details, referred to here as *critical details*. For example, one of the critical details that differed across the four versions of the story in Fig. 1 was whether the car was *abandoned*, *useless*, *wrecked* or *burnt*. There were 20 such sets of *critical items* across the four stories, though the number per story differed. Substituting one alternative critical item for another (e.g., *wrecked* for *burnt*) did not affect the flow or reasonableness of the original material, as verified by five independent judges. Seventy percent of the critical items were nouns, 20% adjectives, and 10% verbs. A female native Spanish speaker tape-recorded the stories.

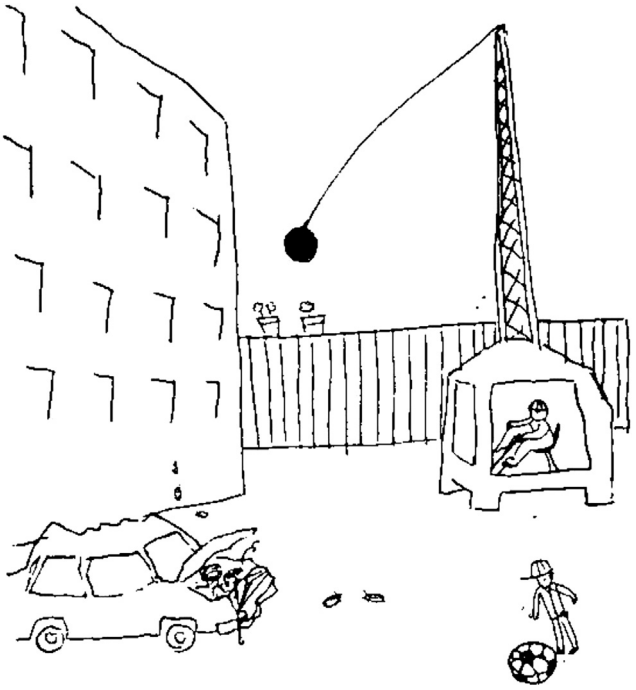

Fig. 1. Example of stimulus story with complete set of critical items and accompanying picture. The coordination of movement between left arm and right arm and between left foot and right foot is necessary to produce the desired effect. The force of the hit depends on the adequate balance of the ball and the weight of the ball. The *strength* (height-consistency-width) of the walls had to be considered also in this equation. Its structure and resistance would make the whole enterprise longer or shorter in time. Running out of fuel would cause the problem of postponing everything. But the work started some time before. *People* (neighbors–tenants–dwellers) and their belongings were taken somewhere else. It seems that *cockroaches* (mice and rats–squirrels–waterbugs) are going to be the only victims. The car would be damaged but since it was *abandoned* (useless–wrecked–burnt), it is going to be something else that has to be removed later.

A booklet presented at the end of the experiment contained a recognition task consisting of 20 four-item forced choice probes. Presented one per page, each probe consisted of a sentence with the critical item deleted. The four different versions of the critical detail were immediately below. The order of items in each recognition probe and the order of the probes themselves were random, but remained the same across participants.

1.3. Design and procedure

The study was run in three sessions, each a day apart. In the first session, each group member was placed in a different room and was asked to listen to the tape-recorded stories with the aim of later remembering them. They were told that some of the stories would have an accompanying picture that would "help them with the stories." For each of the four stories, each member of a group heard a different version of the story. The stories were presented in the same order to each group member, but the order varied randomly across groups. For each story, two of the group members were given a contextualizing picture to go with the story, presented on a separate 8.5×11 in. sheet of paper. The other two did not receive a picture. It was further arranged that every group member received a contextualizing picture for two of his or her stories so that, in the end, each participant in a group studied two stories without a contextualizing picture and two stories with a contextualizing picture. We counterbalanced across groups the pairings of story with contextualizing picture. After study, participants received a ten-minute distraction and then were asked to recollect in writing all four stories, in the order in which they originally heard them. No participant failed to recall at least some of each story.

A day later, the four participants were assembled as a group and asked "as a group" to recount aloud and collaboratively the first story they had listened to the day before. Participants did not know until this point that they would be recalling the story as a group. They were told to remember each story as accurately and in as much detail as possible. They continued on to the next story, the second story they had listened to, only when they assured the experimenter they could not remember anything else. The conversations were audio tape-recorded. We did not include a condition in which no discussion took place inasmuch as our interest was investigating the effects of participation in a discussion. No participants had trouble identifying which story we wanted them to recall.

In the third session, a day later, participants recalled the stories individually, as in Session 1, again in the order in which they had studied them. The forced choice recognition task followed. In the recognition task, subjects were instructed to choose the correct items based on the stories presented during the first session.

1.4. Coding

Two coders transcribed Session 2's group recounting. They did not experience any difficulty in separating who said what. They then identified the critical items in the conversation, determined whether there was a disagreement about the critical item, and identified the participants in this disagreement. A disagreement occurred when one participant mentioned a critical item and another participant raised doubts about its validity and/or offered an alternative. Coders always agreed. Conversational disagreements arose 57.1% of the time a critical item was mentioned. Seventy-one percent of the time the source of the contested item had originally studied the story with a contextualizing picture. Overall, 98% of the disagreements involved an explicit mention of an alternative, and 2% only doubts about validity. Three versions of a critical item were mentioned in a conversation less than 1% of the time. None of the participants discussed in the group recounting whether they had studied the story with a picture or not, nor did they indicate, either during the group recounting or during debriefing, that they suspected that the experimenter may have provided them with different stories.

We employed the coding to determine whether a *critical false recall/recognition* occurred in the final memory test of Session 3. As we define it, a *critical false recall/recognition* occurs when an alternative to a studied critical item emerges in the group recounting and is then falsely recalled or recognized in the final recall or recognition test. For each participant, we used as the numerator the number of critical items a participant falsely recalled/recognized in the final memory test and as the denominator the number of critical items mentioned in the group recounting by someone other than the participant. We also calculated *random false recall/recognition rates*, which occurred when a participant falsely recalled or recognized an alternative version of a critical item he or she studied when the alternative did not appear in the joint recounting. Here the denominator was the number of critical items not mentioned in the group recounting.

2. Results

The critical false recall rates were on average 3.4%. This low performance created floor effects, making interpretation difficult. We therefore concentrate here on the recognition data. Although participants could have shown little confidence in their false recognitions, it is noteworthy that their rate of false recognitions was comparable to other studies, approximately 30% (e.g., Lindsay,

Table 1
Proportion of critical false recognitions as a function of the contextualizing picture during study and interaction during conversational recounting.

	Type of Interaction		
	No disagreement	Disagreement, no participation	Disagreement, participation
Picture present	.31 (.17)	.09 (.09)	.03 (.06)
Picture absent	.36 (.16)	.30 (.20)	.01 (.03)

Note: Standard deviations in parenthesis.

Table 2
Proportion of critical items falsely recognized by individual participants on Day 3 that were either recalled on Day 1 or not recalled on Day 1 as a function of the presence or absence of a contextualizing picture.

	Recalled Day 1	Not recalled Day 1
Picture present	.00	.07 (.10)
Picture absent	.14 (.14)	.27 (.18)

Note. Standard deviations are in parenthesis.

Hagen, Read, Wade, & Garry, 2004). With participants interacting with fellow group members, we could not guarantee independence across participants. Consequently, we followed Kashy and Kenny (2000) and, when employing an ANOVA design, treated group as a nested factor and the mean square for the group × treatment interaction as the error term for testing the treatment effect. For *t*-tests, we treated group as our random variable.

As expected, the hit rate was greater when the to-be-remembered material was studied with a contextualizing picture ($M = .65$, $SD = .15$) than without one ($M = .46$, $SD = .16$, $t(19) = 3.74$, $p < .001$, $d = 1.22$). As to the random false recognition, we failed to find a significant difference across these "Study" conditions (with or without a contextualizing picture, $p > .10$). Overall, the average random false recognition base rate was .07, $SD = .04$.

Concerning the critical false recognition rate, a repeated-measures ANOVA confirmed our predictions (see Table 1). There were main effects for study (with or without contextualizing picture), $F(1, 19) = 30.54$, $p < .001$, $\eta_p^2 = .51$, and participation (no disagreement, did participate, did not participate), $F(2, 38) = 43.55$, $p < .001$, $\eta_p^2 = .61$, and a significant interaction between study and participation, $F(2, 38) = 3.94$, $p < .03$, $\eta_p^2 = .18$. Post hoc analyses revealed that when the context picture was present, the critical false recognition rate was greater when there were no disagreements than both when there were disagreements without participation, $t(19) = 5.37$, $p < .001$, $d = 1.61$, and when there were disagreements with participation, $t(19) = 6.16$, $p < .001$, $d = 2.20$.

When the picture was absent, critical false recognition scores were greater when there was no disagreement than when there was a disagreement with participation, $t(19) = 9.68$, $p < .001$, $d = 3.04$. The difference between critical false recognition scores when there was no disagreement and when there was disagreement without participation was not significant, $t(19) = 1.27$, $p > .10$, $d = .33$. Moreover, critical false recognition scores were markedly greater when there was disagreement without participation than when there was disagreement with participation, $t(19) = 6.10$, $p < .001$, $d = 2.02$.

We also examined whether critical false recognition scores in the Picture-Present and Picture-Absent conditions differed as a function of participation type. We found a significant difference only when there was disagreement without participation, $t(19) = 5.67$, $p < .001$, $d = 1.35$. In other words, the effect of disagreement disappeared when the picture was absent and there was no participation.

We examined whether a similar pattern was found when we contrasted critical false recognition rates with random false recognition rates. We found the expected pattern. Critical false recognition scores were significantly greater than the random false recognition base rate in all instances ($p < .05$). That is, we failed to find social contagion: (1) when a participant studied the story with a contextualizing picture and participated in the disagreement, and (2) when a participant studied the story with a contextualizing picture and did not participate in the disagreement, and (3) when a participant studied the story without a contextualizing picture and participated in the disagreement. In other words, disagreements diminished the level of social contagion, but only when listeners participated in the disagreement or failed to participate, but still retained a good memory for the original material. When a disagreement included an alternative to what a speaker said, there was a slight tendency for a speaker (as opposed to a disagreeing partner) to serve as the source of contagion, with the speaker in such instances producing 57.4% of the social contagions (for similar findings, see Gabbert, Memon, & Wright, 2006).

It is possible that the level of social contagion of overhearers could have depended not on the type of participation per se, but on whether overhearers remembered a contested item covertly. Such covert remembering is presumably more likely in the Picture-Present condition than the Picture-Absent condition, thereby leading to a lower level of social contagion for disagreement without participation in the Picture-Present condition. It could also account for the higher level of social contagion in the Picture-Absent condition, again when there were disagreements without participation, inasmuch as, in the Picture-Absent condition, covert recollection should be unlikely to occur. According to this line of reasoning, if one could confine the analysis of disagreements without participation to just those instances in which covert recall takes place, then the difference between the Picture-Present and the Picture-Absent condition should be substantially reduced, if not disappear. That is, for disagreements without participation, there should be an interaction between the presence of covert Recall and Study condition.

Although we cannot determine whether an item is covertly remembered during a group recounting, we might use participants' recall on Day 1 as a proxy. That is, if participants recalled an item on Day 1, they at least have the potential to recall it – covertly or overtly – on Day 2. The data suggest that recall on Day 1 is indeed a reasonable proxy. Participants failed to recount on Day 2 what they recalled on Day 1 only 13% of the time. On the other hand, they recalled an item on Day 2 that they failed to recall on Day 1 only 6 times. In addition, 91% of the contested items on Day 2 were items remembered on Day 1. Of course, if Day 1's recall is to serve this proxy role, then there must be a reasonable number of instances in which participants did not contest an item that they remembered on Day 1. Twenty percent of overhearers remembered the contested item on Day 1. Of these, 45% were in the Picture-Present condition, 55% in the Picture-Absent condition.

If covert recall is driving our results in the disagreement without participation condition, then, using Day 1 as our proxy, we would predict a significant interaction between Day 1 Recall and Study. We undertook an item-by-item analysis, contrasting the proportion of critical items falsely recognized on Day 3 that were recalled on Day 1 with the proportion of critical items falsely recognized on Day 3 that were not recalled on Day 1 (see Table 2). In an ANOVA, we found a significant main effect for Initial Recall, $F(1, 19) = 8.704$, $p < .01$, $\eta_p^2 = .31$, and for Study, $F(1, 19) = 14.55$, $p < .01$, $\eta_p^2 = .45$. We failed to find a significant interaction between Initial Recall and Study, $F(1, 19) = 3.09$, $p = .10$. This failure suggests that the presence of covert remembering may account for some of our results, but cannot supply a full account. These findings also support the claim that our pattern of data reflects the presence of social contagion rather than the failure of participants to remember the original material and hence "filled in the gap."

3. General discussion

The present results underscore how difficult it is to generalize from situations in which an experimenter manipulates variables to those that might be found in daily life. Here we examined conversational remembering, a common everyday experience, and considered how the pragmatics of a conversation can affect the extent to which social contagion occurred as a result of the conversation. On the surface, one might expect that the discourse practice of disagreeing with a recollection could serve as an implicit warning and, accordingly, diminish social contagion under the circumstances described by Muller and Hirst (2010). And indeed, for overhearers, we found similar results. That is, a disagreement diminished social contagion if the overhearer possessed a good memory of the original material and had no effect when the overhearer possessed a poor memory.

A different pattern was found when a participant actively engaged in the disagreement. On the surface, the information available to overhearers and active participants is the same: that a particular recollection is suspect. But the context of the contestation differs for overhearers and active participants. Overhearers need not commit to the suspicious quality of the contested memory and probably will not when their memory for the original material is poor. Active participants, however, are making a commitment, even when objectively their memory for the original material is poor. It is important to emphasize that the credibility of the speaker is not relevant here, inasmuch as it is generally the same for both overhearers and active participants. What matters is the nature of the participation in the disagreement.

Returning to situation models, then, if the disagreement is treated as an instruction, then the way ovehearers and active participants translate the disagreement into an instruction differs. For active participants with a poor memory, the instruction becomes: "Do not update your model," inasmuch as, in this instance, they are committed to the possibility that the contested recollection is wrong. For the ovehearers with a poor memory, the instruction becomes: "Pay attention to the contested information." There is no firm commitment to the veracity of the contested item and hence no instruction as to whether or not to update. Whereas we did not explore the factors that might be expected to lead a person to participate in a disagreement, or serve as an overhearer, the present results indicate that the effect of a disagreement on social contagion depends on the nature of the participation.

3.1. Practical application

Psychologists have long appreciated the importance of studying social contagion, but have rarely considered it in the contexts in which it is most likely to occur, e.g., free-flowing conversations. As a consequence, the "pragmatics" of social contagion has largely been ignored. We have highlighted the cost of this neglect by demonstrating that disagreements cannot be treated as conversational equivalents of the warnings provided by an experimenter in many laboratory studies. Factors such as participation matter when considering a conversation, but would never be examined in the standard laboratory assessment of social contagion. By focusing on the role of participation, we have highlighted how social contagion might work differently when people talk directly to one another, or when they act as overhearers, as they often do, when eavesdropping at a restaurant, listening passively to friends talk, or watching a debate on television.

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