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Memory and jury deliberation:
The benefits and costs of collective remembering

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The support of National Science Foundation grant #BCS-0819067 is gratefully acknowledged.

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As the papers in this volume make clear, the psychological study of memory can have a profound impact on the law, particularly with respect to the veracity of eyewitness testimony (see also Loftus, 1996; Wells, Memon, & Penrod, 2006). Less appreciated is the role the psychology of memory might play in understanding how juries remember the testimony presented in a trial during their deliberations. Even though, as one study suggests, almost 10% of what juries talk about is trial evidence (Warren & Kuhn, 2010), the large literature on the psychology underlying jury judgment-making barely addresses how this jury-based remembering might unfold (see Kapardis, 2010, for a review of the research on jury decision making). This lacuna is unfortunate. Jurors must remember what they heard during the trial in order to make a reasoned decision, and Courts often instruct jurors about how they should treat what they recall during deliberation. The extant judicial rulings suggest that the Courts have a bias toward instructing the jury to rely on their “human memory” rather than on mnemonic technology, such as notes or written transcripts. The Courts appear to believe that, even if human memory is unreliable, the collaborative efforts of the jury will compensate for its flaws and produce, through the collaboration, a “fairly” accurate representation of what took place during the trial.

This paper explores whether the psychological assumptions of the Courts are reasonable. The final judgment of a jury is tethered tightly to the collaborative remembering taking place during deliberation. If the Courts are wrong, what is remembered may diverge in critical ways from the original testimony and, in doing so, may lead to a flawed final judgment. It is important to determine not only if the Courts are correct in their reliance on collective remembering to

produce accurate recollection, but also whether a psychological understanding of the dynamics of collaborative remembering might help the Courts devise instructions that could mitigate any memory errors that might arise from the collaboration. In what follows, we will first discuss the relevant judicial decisions and then turn to the psychological work on collaborative remembering.

Relevant Court Rulings on Issues Concerning Remembering during Jury Deliberation

The Sixth Amendment of the Constitution provides that an individual accused of a crime has a right to a trial by an impartial jury. Claims of jury bias are subject to “harmless error analysis,” with appellate courts only required to consider an appeal if an error of law was made that is deemed “serious” rather than “harmless” (Traynor, 1970). As a result, habeas corpus relief is only granted when constitutional trial errors have “substantial effect or influence in determining the jury’s verdict.” The Courts have utilized “harmless error analysis” when dealing with issues of memory as they apply to jury deliberations.

Generally, the Courts have asked jurors to rely on their own memories rather than mnemonic technologies when trying to remember testimony individually or collectively. Until recently, for instance, there has been a resistance to allowing jurors to take notes during the trial and use them as memory aids during deliberations (Petroff, 1965). This hesitancy can be traced back to a period when illiteracy was prevalent. The Courts feared and still worry that jurors who take notes will have greater credibility during deliberations than those who do or cannot. They also fret that note taking may distract jurors during the trial. They are acutely aware that notes can be inaccurate and that they could focus on details and irrelevances in a way ordinary recollection might not. Today, the Courts generally allow note taking, though there are exceptions. According to a study of the National Center for States Courts (Mize, Hannaford-

Agor, & Waters, 2007), 29% of the federal courts and 31% of the states courts prohibit note taking. The attitude of the Courts can be captured by two quotes. The Chief Judge of the State of New York (Lippman, 2009) cautions: “Judges [should] be permitted to allow jurors to take notes as a matter of judicial discretion, so long as the jurors are instructed not to rely unduly on their own or others notes....” (p. 9) The State of Connecticut offers the following instructions for judges to give to juries:

Notes are a sound tool to help you refresh your recollections during the deliberative process of this trial. However, notes, by themselves, are not foolproof. If there is a conflict between your notes and your recollections, *it is your recollection that must prevail*. (Criminal Jury Instructions on Note-taking, State of Connecticut, revised June 12, 2009; www.jud.ct.gov/ji/criminal/part1/1.2-11.htm; italics added by the present authors.)

As an aid to memory, jurors can, of course, ask for readbacks. These can take the form of the judge or a court reporter reading to the jurors the requested portion of the court record. A written version of this court record can also be provided, as an alternative. [Courts generally do not allow the use of videotapes of the trials proceedings as a form of “readbacks.”] In most states, a judge is not required to supply a readback, even when it is requested (*US v Escotto*, 1997). The judge should consider (1) the length of trial, (2) complexity of the issues, (3) the number of witnesses, (4) the amount of testimony requested, (5) importance of the requested testimony, (6) the inconvenience to the courts, (7) whether confusion or boredom will result, and (8) whether the request will take the testimony out of context. According to *US v Escotto*, if there is a close call, a judge should lean toward a readback. Generally, the preference is for verbal readbacks over written transcripts because the Courts cannot control what is done with the

written transcript once it is handed to the jury. One person may read it and summarize it to the others, or there may be multiple readings of some, but not all of the transcripts. Both of these uses of the transcripts could bias the deliberations. This preference for oral readbacks cannot be viewed as a perfect solution to the memory problems that led to the request for a readback, in that jurors must now remember the verbal readback. At no point will the entire written transcript of the court records be accessible to the jury.

As with note taking, when written transcripts are provided, Court rulings urge judges to instruct jurors to rely on their memory over the written transcript when there is a conflict. Suggested instructions specifically refer to the jury's "collective memory." For instance, the jury instructions suggested by *US v Montgomery* (1998) state:

I want you to bear in mind that the testimony at trial is the evidence, not the transcript. The transcript is not authoritative. If you remember something different from what appears in the transcript, your collective recollections is controlling. In other words, the transcripts may not serve as a substitute for the collective memories of the jury....

Presumably, the reasoning here is that if 12 jurors all agree on what was said during the trial than they must be right, even if the written transcript, which is also subject to human error, differs.

This reliance on the jurors' memory during deliberation, especially their "collective memory," might be legitimate if collective remembering produced the accurate and complete recollections that individual acts of remembering cannot. The psychological literature suggests otherwise.

Psychological Literature on Collaborative Remembering and its Mnemonic Consequences

On the Nature of Collaborative Remembering and Collective Memories

Even though collaborative remembering has not been studied in the jury setting to date, there is a sufficient body of work on collaborative remembering in more neutral contexts to bring into question some of the Court's declarations. This burgeoning literature on collaborative remembering and collective memory can be divided into two areas: (1) research addressing the issue of what is remembered during the collaboration and (2) research exploring how the collaborative remembering affects subsequent memory (see Hirst & Echterhoff, in press). Both are relevant to any study of remembering in the jury setting. The former, for instance, addresses the issue of whether collaboration leads jurors to remember more during the collaboration than they might as individuals. The latter explores whether the memory that group members hold after the collaboration is more complete or accurate than the memory they might hold if the collaboration never took place.

The Effect of Collaboration on Remembering during Collaboration

Groups, as a unit, remember collaboratively more than any group member might remember alone (*collaborative facilitation*). This facilitation can be clearly observed when the group forms a transactive memory system, in which group members distribute among themselves the job of memorizing and remembering (see Wegner, 1986; Andersson & Rönnerberg, 2005). But transactive memory systems are unlikely to exist among unrelated individuals, such as jury members. When psychologists consider remembering within groups of unrelated individuals, the benefits of collaborative remembering appear to be limited.

One reason for this limitation is that, one putative source of benefit, the cross-cueing that might arise in conversations, does not occur as frequently as one might expect (Meudell, Hitch,

& Boyle, 1995; Meudell, Hitch, & Kirby, 1997). But there are other explanations. For instance, even though a group might remember more than any individual would alone, it does not recount the sum of all that its individual members are capable of remembering (*collaborative inhibition*). Selective remembering may be typical of all acts of remembering (Marsh, 2007). The presence of collaborative inhibition, however, suggests that collaborative remembering does not improve the situation; rather, it can exacerbate it. It does so for several reasons. First, individuals communicating with others will tune what they say to their expectation about what their audience wants or expects, selecting from a range of possible memories the relevant or desired ones (Echterhoff, Higgins, Levine, 2009; Pashupathi, 2001; Marsh & Tversky, 2004). Second, some group members may “loaf,” leaving the task of remembering to others. Third, the collaboration may lead to retrieval blockage (Basden, Basden, Bryner, & Thomas, 1997; Weldon, 2001; Weldon, Blair, & Heubsch, 2000). That is, one person in a conversation may pursue a retrieval strategy that is effective for her, but not necessarily ideal for other conversational participants. As a result, the other participants may have difficulty recalling material they might have easily recalled alone. Various experimenters have shown that collaborative inhibition cannot be accounted for by audience tuning or social loafing alone (Weldon et al., 2000). Retrieval blockage plays a critical role (Basden et al., 1997).

Collaborative inhibition can be effectively diminished in group recountings, but the jury setting seems designed to promote rather than limit it. For instance, collaborative inhibition depends on the relationships among group members, with collaborative inhibition all but disappearing in long-term couples (Harris, Paterson, & Kemp, 2008; Johansson, Andersson, & Rönnerberg, 2005). But juries consist of unrelated individuals. Moreover, group size matters. Groups of two, for instance, often do not exhibit collaborative inhibition (Thorley & Dewhurst,

2006). Juries, however, are quite large, at least in comparison to the size of the groups in all extant studies of collaborative inhibition. Ranging in size from six to twelve in the United States, their size almost guarantees collaborative inhibition.

Limits on the efficacy of collaborative remembering can also arise because of the *information sampling bias* that exists in what conversational participants recall. As a result of this bias, unshared information (unique to one participant) is less likely than shared information to surface in a group recounting (Wittenbaum & Parks, 2001; Wittenbaum & Stasser, 1996). Accordingly, jurors should be more likely to recollect what each of their fellow jurors encoded about the testimony rather than something that they themselves alone may have noticed.

In other words, collaboration during deliberation may actually prevent critical testimony from surfacing into the jury's discussion that, under other circumstances, would be remembered. Although the limits of cross-cueing, collaborative inhibition, and information sampling biases have not been explicitly studied in a jury setting, several studies of memory and juries reinforce what these phenomena suggest: There are limits to the role deliberation may play in facilitating recall. When individuals were asked to act as if they were jurors, their memory of the testimony they heard previously was, as expected, selective, with jurors individually remembering information consistent with the "story" they constructed around the testimony rather than the testimony in a complete, unbiased form (e.g., Pennington & Hastie, 1992). Moreover, in work more directly related to our concerns about deliberation, Pritchard and Keenan (1999, 2002) contrasted the memories of jurors before and after a mock jury deliberation, probing in each instance for memories of specific aspects of the testimony. They found no improvement in memory after the deliberation of testimony central to the verdict, and only a 10% improvement for peripheral information.

The Effect of Collaboration on Subsequent Memory

The current literature clearly establishes that what speakers and listeners say to each other as they collectively remember changes their subsequent individual memories (Cuc, Ozuru, Manier, & Hirst, 2006; Gabbert, Memon, & Allan, 2003; Gabbert, Memon, Allan & Wright, 2004; Wright, Self, & Justice, 2000). Most of the experimental work supports this conclusion by placing a memory probe after the conversation. Nevertheless, the findings are important for understanding the consequences of jury deliberation because they suggest that the memory jurors hold as they make their final judgment may differ from the one they possessed as the deliberations began. Indeed, if conversations alter memories, as studies claim, then they probably do so “on-line,” reshaping memories as they proceed. These conversational shifts may be quite dramatic when it comes to jury deliberations, in that the deliberation can last for hours, if not days, and are frequently punctuated with breaks.

The experimental literature suggests that conversations can alter memory in at least four ways: social contagion, rehearsal, cueing/retrieval-induced facilitation, and retrieval-induced forgetting. In each instance, effects on memory can be divided into two general classes: (1) effects of what a speaker says on the speaker's own memory, and (2) effects of what a speaker says on the listener's memory.

(i) Social contagion: Postevent misinformation effects and source monitoring problems. When two people jointly recount previously studied material, one of the recounters may introduce misinformation into the recounting. In turn, other participants may subsequently remember this misleading information as though it occurred in the originally studied material (see Chapter XX in this volume by Loftus for a review of this work). This postevent misinformation effect is often interpreted as a source monitoring error (Johnson,

Hastroudi, & Lindsay, 1993). The misinformation effect has been shown when the source was not a person, for instance, written text. It was stronger, however, when the source was social, for instance, a person in a conversation (Cuc et al., 2006; Echterhoff, Groll, & Hirst, 2007; Echterhoff, Hirst, & Hussy, 2005; Gabbert et al., 2003; Gabbert et al., 2004; Meade & Roediger, 2002; Reysen & Adair, 2008; Wright et al., 2000). When a social source implants misinformation, it is often referred to as *social contagion*.

At least in regard to the law, social contagion and the postevent misinformation effect have mainly been studied in terms of the reliability of eyewitness testimony. A lawyer's leading questions, for instance, may alter existing memories or implant misinformation in a way that could lead to false testimony (Loftus & Zanni, 1975). Such work underscores the need for judges and jurors to take into account the malleability and unreliability of memory when arriving at a judgment. Similarly, it is theoretical possible that misleading information could surface in the discussions jury's have during deliberation. One juror may incorrectly remember what occurred in the trial, and this misleading recollection could spread through the jury, until most, if not all jurors come to remember the trial in the same, erroneous way (Brown, Coman, & Hirst, 2009; Cuc et al., 2006). Although such contagion could occur, we suspect that it does so infrequently. First, the number of error of commissions may be small during jury deliberations. Jurors may omit some details, but they are unlikely to introduce information that never appeared in the trial. Many experimental studies report that misleading information was introduced into a recollection around 5% of the time. Moreover, when misleading information was introduced by one jury member, it is likely to be corrected by other jury members (Tschuggnall & Welzer, 2002). Experimental studies have demonstrated that this corrective tendency increases with the size of the group (Thorley & Dewhurst, 2007). The self-corrective nature of groups probably

makes the proportion of uncontested errors of commission significantly smaller than 5%. Finally, even when a small number of errors of commission are not corrected, the chance of this error spreading through the jury is also limited. Misleading information is implanted in experimental participants about 30% of the time (Lindsay, Hagen, Read, Wade, & Garry, 2004; Loftus, 2005). Similar rates are thus likely to occur in a jury setting as well. Pritchard and Keenan (2002), for instance, found that when members of a mock jury were probed for what they could remember prior to deliberation, they were more likely to fail to answer a question than to answer it incorrectly. Moreover, around 50% of the time, “errors of commission” in the pre-deliberation memory test were, in turn, correctly discussed during deliberation. We suspect that an extremely small proportion of what is remembered during a deliberation might be construed as errors of commission. Of course, any widely held false memory is troubling, especially if the error is dispositive. Nevertheless, as we shall see, there are other, more likely candidates for how collaborative remembering during jury deliberations, which may distort both the jury’s memory, but also their final judgment. These should be of more concern to the Courts when they consider how to facilitate accurate and complete recall as juries deliberate.

(ii) Rehearsal. When a speaker in a conversation repeats something already known to the listener, by virtue of the repetition, one would expect and indeed finds an improvement on subsequent memory tests for both speaker and/or listeners (Blumen & Rajaram, 2008; Rajaram & Pereira-Pasarin, 2007; Weldon & Bellinger, 1997). This effect is stronger for speakers than for listeners (Cuc et al. 2006). As Karpicke & Roediger (2007, 2008) have averred, the speaker may have an advantage because retrieval is “key to long-term retention” (see also Slamecka & Graf, 1978; see Mulligan & Lozito, 2004, for a review of the generation effect). Interestingly, because speakers and listeners do not equally share the

burden of retrieval and generation, it is possible for joint encoding of material to work against facilitation and produce worse subsequent individual recall than would individual encoding (Barber, Rajaram, & Aron, 2010). Nevertheless, jurors are probably more likely to retain over time information mentioned during their deliberations than information that goes unmentioned.

Information mentioned during deliberations, then, might be expected to have a stronger bearing on the final judgment than information that goes unmentioned. What emerges during deliberations and hence what becomes more accessible as the deliberations proceeds depends on several factors. For instance, Pennington and Hastie (1992) suggested that what people remember during deliberation was the material consistent with the “story” developed during the trial. However, how the deliberation itself unfolds may also determine what is remembered, as the work on collaborative inhibition and informational sampling biases indicates (Stasser & Titus, 1987; Weldon & Bellinger, 1997; Weldon et al., 2000; Wittenbaum & Stasser, 1996). Cuc et al. (2006) observed that one person often dominates a conversation, and we see no reason why this would not also apply to jury deliberations. As Cuc et al. demonstrated, this “dominant Narrator” has a large influence on subsequent remembering. For instance, one juror’s domination over the conversation may lead the jury to rehearse one set of memories to the exclusion of others. As a result, the final recollections of the jury may reflect the rendering of the trial offered by this dominant Narrator and not necessarily the rendering originally held by others. It is presently unclear why one member of a group might become a dominant Narrator, or what instructions might be given to a jury that would lessen this possibility. What is certain is that, without the appropriate instructions, a dominant Narrator could emerge during deliberations.

(iii) Cueing and retrieval-induced facilitation. In instances in which cross-cueing does occur, the cued memory should offer an unexpected chance for rehearsal, thereby increasing the probability that this newly remembered item will be subsequently remembered by all group members. The cue could elicit a memory that is not shared with others. The phenomenon of *retrieval-induced facilitation* could be viewed as an example of such cued covert remembering¹. Here, selective remembering by a person appears to trigger covert remembering of related, but unrecalled information by the same individual. The experimental evidence clearly demonstrates that the unmentioned, but related memory was better remembered on a subsequent memory test than it would have been if the selective remembering had never occurred. However, just as jury deliberation may not be an ideal environment for cross cueing generally, it may also not be conducive for retrieval-induced facilitation. Chan and his colleagues (e.g., Chan, McDermott, & Roediger, 2006) have stressed that retrieval-induced facilitation requires a broad retrieval search on the part of the rememberer. The rapid give-and-take of a conversation, including the conversation taking place during jury deliberations, may not allow enough time for the broad search need to elicit retrieval-induced facilitation.

It would appear, then, that possible positive outcomes of collaborative remembering – cross-cueing, retrieval-induced facilitation, and the rehearsal benefits they accrue – may not occur frequently enough to compensate for any negative outcomes of collaborative remembering. There may be, of course, ways to encourage the use of cross-cueing and retrieval-induced facilitation. For instance, a jury might be instructed to use what their fellow jurors say to jog their memory as they attempt to reconstruct what

¹ By *covert remembering*, we mean that the rememberer retrieves the item, is personally aware of the memory, but does not share it with others, e.g., remaining silent and keeping it to herself.

occurred during the trial. However, the implications of such instructions on the way jurors evaluate evidence and their effect on the final judgment is unclear and needs further investigation.

(iv) Retrieval-induced forgetting. As we have emphasized, collaborative remembering produces selective remembering. Recent research indicates that, in a conversation, this selective remembering may induce forgetting in speakers (the person doing the remembering; *within-individual retrieval-induced forgetting*, WI-RIF) and listeners (the person listening to the speaker remember; *socially shared retrieval-induced forgetting*, SS-RIF; see Hirst & Echterhoff, 2008; in press). These two types of forgetting could play a substantial role in shaping the memories of individual jury members. In both instances, what is forgotten is the unmentioned (or unrecalled) material, but, importantly, the rate of forgetting is not the same for all unmentioned material: Unmentioned material related to what was remembered is forgotten at a greater rate than unmentioned and unrelated material. In a way, this pattern suggests that it may be better not to remember at all than to selectively remember.

In the original RIF paradigm of Anderson and his colleagues (Anderson, Bjork, & Bjork, 1994), participants studied category-exemplar pairs such as *animal-cat*, *animal-dog*, *vegetable-broccoli*, *vegetable-pea*. They then retrieve selectively some of these pairs by completing cued words (e.g., *animal-d ____*). This additional practice focused on some pairs (e.g., *animal-dog*), but not other related pairs (e.g., *animal-cat*) and did not involve whole sets of pairs (e.g., all the vegetable pairs). A final recall or recognition test for the original word list followed. This design established three types of retrieval items: practiced items (Rp+), unpracticed items related to practiced items (Rp-), and unpracticed items unrelated to practiced items (Nrp) (see

Table 1).

Using this paradigm, researchers have found, as the previous summary of results indicated, that (within-individual) retrieval-induced forgetting is indicated by the telltale pattern of $Nrp > Rp$ - (see Anderson & Levy, 2002, for a review). This mnemonic pattern suggests that the forgetting here is not merely a matter of decay, but, at least as some researchers have suggested, inhibition induced by selective practice (Anderson & Levy, 2002, but see, for example, Perfect et al., 2004, for alternative explanations). WI-RIF can be found for a wide range of material, e.g., visuo-spatial stimuli, paired associates, stories, and autobiographical memories (Ciranni & Shimamura, 1999; Anderson, Bjork, & Bjork, 1994; Saunders & MacLeod, 2002; Barnier, Hung, & Conway, 2004). Moreover, although in some instances it lasts 24 hours (Miguelles & Garcia-Bajos, 2007), in other instances, it can last for over one week (Storm, Bjork, Bjork, and Nestojko, 2006; Tandoh & Naka, 2007, but see MacLeod & Macrae, 2001). Either time frame suggests that RIF may be at play during jury deliberations.

Recently, Hirst and his colleagues have extended the WI-RIF paradigm to capture induced forgetting in a social context. They modified the paradigm to include both a speaker (the person doing the remembering) and a listener. In doing so, they directly probed for the way collaborative remembering might elicit RIF. In a representative experiment, Cuc, Koppel, and Hirst (2007) followed the procedure of Anderson et al. (1994), but now asked two participants to study the material. During the retrieval practice phase, one participant selectively recalled the material, while the other listened. Finally, both participants individually recalled the original list. Under certain conditions, more specifically, when monitoring for accuracy, Cuc et al. found RIF for both speakers and listeners. They argued that SS-RIF occurs because the listener concurrently, albeit covertly, recalled the material along with the speaker. As a result, the

conditions for retrieval-induced forgetting hold for both speaker and listener.

As with WI-RIF, this covert, concurrent remembering, and the subsequent SS-RIF, occurs in a free-flowing conversation in which speaker and listener seek to jointly recount a previously studied story. In some SS-RIF experiments examining free-flowing conversations, two participants individually studied a story. The stories were structured around episode-event pairs, for example, the episode *going to Coney Island* contained the events *eating hot dogs* and *riding the roller coaster*. Formally, the stories do not differ structurally from the category-exemplar pairs used in other retrieval-induced forgetting experiments. After studying the stories (with an appropriate delay), the two participants jointly recounted the story to each other. No instructions are given about how the conversation should unfold other than to jointly recount the story. In the final memory test, following the conversation after a 10 or more minutes delay, each person individually recalled the story. The conversation was transcribed and then classified in terms of practice type (Rp+, Rp-, and Nrp) and conversational role (speaker, listener).

Cuc et al. (2007) observed robust within-individual and socially shared retrieval-induced forgetting following the free-flowing conversation. They argued that when participants are asked to recount jointly a previously studied story, listeners in the conversation value accuracy and hence are inclined to concurrently, albeit covertly, retrieve. As with WI-RIF, SS-RIF can be found for a wide range of material, including highly memorable, schema consistent elements of a story (Stone, Barnier, Sutton, & Hirst, 2010a), autobiographical memories (Coman, Manier, & Hirst, 2010; Stone, Barnier, Sutton, & Hirst, 2010b), and science articles and textbooks (Koppel, Wohl, Meksin, & Hirst, 2010). Moreover, as Hirst and Ecterhoff (2008) recently observed, studies of retrieval-induced forgetting and conversations tended to report higher levels of retrieval-induced forgetting than do those that employ a structured retrieval practice phase, an

observation that probably reflects the claims of Chan et al.'s (2006) that the counterpoint to retrieval-induced forgetting, retrieval-induced facilitation, needs sufficient retrieval time to emerge. As already noted, the rapidity of conversations often does not supply the needed time.

These remarks suggest that jury deliberation may be an effective medium for induced forgetting. The selective remembering at the beginning of a process might induce not just the rememberer, but all jurors to have difficulty remembering related, but unmentioned memories at a latter time in the deliberations. Each juror, after all, hears the same material recalled and the same material left unstated. It is not hard to imagine how such induced forgetting could be detrimental to a balanced consideration of the testimony. Jurors who figure critically at the beginning of a deliberation could not only reinforce some testimony, but increase the chance that other possibly relevant testimony might not arise as the deliberations proceed. The notion that the collective efforts of the jurors will lead to more complete and unbiased recollection of the testimony may simply not hold true.

SS-RIF as a mechanism for collective forgetting. The judgments of juries are arrived at collectively, even if the voting is done individually. This collective judgment could move more quickly to conclusion if there was agreement among jurors about their recollections of the trial. We will refer to shared individual memories as *collective memories* (Hirst & Manier, 2008; Hirst & Echterhoff, 2008; Rajaram, 2010). Inasmuch as conversations can collectively facilitate the subsequent recall for some information and induced forgetting for other information, they provide one means of promoting the formation of collective memories. Cuc et al. (2006) contrasted the degree to which the memories of previously studied material overlapped prior to a conversation with the overlap subsequent to the conversation. During the conversation, four participants recounted what they could remember of the studied material. Cuc et al. found an

increase in overlap from pre-conversation to post-conversation assessments. Moreover, they found that when conversational participants studied slightly different versions of the story, with different *contrasting details*, the overlap could be accounted for, in part, by the social contagion that lead different participants to adopt the same contrasting details. This latter finding underscores the role social contagion could play in the formation of collective memories.

As we noted, the role of rehearsal and retrieval-induced forgetting might be more critical when considering jury deliberations than social contagion. Roediger, Zaromb, & Butler (2009) has articulated in detail the role retrieval and rehearsal can play in the formation of collective memories. Re-exposure during deliberation to an aspect of the original testimony, for instance, will not only make it more likely that the speaker will subsequently find this aspect more accessible, but that other jurors will as well. This increase in shared accessibility should increase with the number of reexposures.

As for RIF, because the pattern of remembering and induced forgetting is the same in both speaker and listener, we should also find not just an increase in accessibility for the mentioned material among jurors, but also a decrease in accessibility for the unmentioned, but related material. Stone et al. (2010a) assessed this possibility by calculating the proportion of previously studied material *remembered* individually, but in common, by two participants (RR) and the proportion *forgotten* individually, but in common, by the two participants (FF). He then contrasted the overlap scores in a cued recall test prior to a conversation between the two participants with the overlap scores in a cued recall test subsequent to the conversation. Both RR and FF increased subsequent to the conversation. Conversational participants came to remember and forget similar material as a result of the selective practice embedded in the conversation.

A closer look at SS-RIF: Moderating factors. If SS-RIF can promote collective

forgetting, are there ways to diminish the level of induced forgetting, or, worse yet, increase it? The presence of SS-RIF depends on the goals of the participants when remembering in a social context. For instance, Cuc et al. (2007) manipulated how listeners monitored speakers and found SS-RIF when the listener was asked to judge the accuracy of what the speaker remembered, they showed greater SS-RIF than when they were asked to judge the fluency with which the listener remembered. The former presumably encouraged concurrent retrieval on the part of the listener, whereas the latter did not. As noted, Cuc et al. also argued that instructions to jointly recount a story also emphasize accuracy.

What are the goals of the jurors during deliberations? As we saw in the section on judicial rulings and instructions, jurors are asked to rely on their collective memory. How this instruction translates into specific ways jurors monitor each others recollections is unclear, but, no doubt, jurors may be more inclined to monitor for accuracy than, for instance, people in idle conversation at a dinner party. As a result, jurors should be susceptible to SS-RIF. The need for accuracy may also be accompanied by a need to remember the trial as completely as possible. Although the presence of such a goal would suggest that the usual selective remembering characteristic of conversation may not hold for jury deliberations, the available literature, as scant as it is, suggests otherwise. The failure of Pritchard and Keenan (1999, 2002) to find any improvement in memory after a deliberation suggests that the recounting during the deliberation was far from complete. These conclusions must be tentative, however. As yet, no one has studied RIF effects in the context of a jury deliberation.

One concern of the Courts is to ensure that no juror is perceived as an expert or more credible than others. Juries should be, at least in theory, a collectivity of peers, and as such, each member's opinion or recommendation should be given equal weight. In reality, of course, one

member may project greater authority, expertise, or credibility, than others. This level of expertise should not be confused with the level of expertise shown to minimize collaborative inhibition in at least one study of conversational remembering (Meade, Nokes, and Morrow, 2009). In this study, the experts were seasoned air pilots. Jury selection ensures that no one on a jury has that level of expertise. Nevertheless, the Court is correct when they worry that one person may be perceived as having a greater level of authority, even if they do not evidence a professional level of expertise. This perception may be enough to allow the individual to adopt the role of dominant Narrator, which in turn would give this person greater influence on subsequent memory (Brown, Coman, & Hirst, 2009; Wegner, 2006) – a clear cost. On the other hand, when a speaker is perceived as an expert, the level of SS-RIF is diminished (Koppel, Wohl, Meksin, & Hirst, in preparation), in that listeners are less likely to assess the accuracy of what the speaker says if the speaker is viewed as an expert. Unfortunately, only one (or a few) members of a jury can serve the role of an “expert,” leaving the degree to which others may induce socially shared forgetting intact. Moreover, social contagion is more robust if the speaker is perceived as an expert (Dodd & Bradshaw, 1980; Smith & Ellsworth, 1987).

Collective Memory and Decision-Making

As we have emphasized, the Courts are concerned about how jurors remember while deliberating because their recollections could shape their judgments concerning acquittal. According to retrospective reports, in most instances, jurors form their opinions during the deliberation, not prior to the deliberations (Hannaford-Agor, Hans, Mott, & Munsterman, 2002). Moreover, pre-deliberation voting is both of low frequency (Devine et al., 2004; Diamond & Casper, 1992) and, unless there is a strong initial sentiment for conviction, the initial vote does

not predetermine the outcome of the deliberation (Salerno & Diamond, 2010). Clearly, the deliberation, and presumably what is remembered in the deliberation, plays a significant role.

Psychological work on decision-making outside of the jury setting indicates that mnemonic accessibility can guide decision-making (Hastie, 1993; Hastie & Park, 1986; Iglesias-Parro & Gomez-Ariza, 2006; Pennington & Hastie, 1992; Weber & Johnson, 2009). However, the needed work with actual or mock juries has not been done. Pritchard and Keenan (1999, 2002) have shown that what individual jury members remembered after deliberation (actual collaborative deliberation) determined, in part, their judgment, but they failed to investigate the effect of what juries remember collaboratively *during* the deliberation on judgments.

As to the specific mechanisms we have been discussing, Bernstein and Loftus (2009) have shown that an implanted memory can shape subsequent decisions. They studied this issue in the context of food selection. They implanted a memory of a food poisoning incident in childhood and then gave participants the chance to consume the now tainted food. The implanted memory led participants to avoid the tainted food.

As to RIF, in a study that bears only indirectly on the relation between RIF and decision making, Storms et al. (2005) failed to find a relation between the forgetting effect and likeability ratings in a RIF paradigm that induced forgetting for either positive or negative traits of a person's description. In a more relevant study, Iglesias-Parro and Gómez-Ariza (2006) found RIF guided the decision making process of selecting job applicants. More recently, D. Coman, A. Coman, and Hirst (2010) taught participants about a fictitious disease, Wheeler's Syndrome, its symptoms, and the strengths and weaknesses of various treatments. After a delay, they asked participants to read a brochure about the disease, which only selectively covered the treatment's strengths and weaknesses. Not only did they find that reading the brochure induced forgetting in

a manner found in other RIF experiments, but also discovered that it influenced the decisions participants made about which treatment to pursue: What participants were induced to forget by the brochure influenced their decision about the course of treatment. Their final decision could not be predicted by what was practiced as a result of the brochure, only by the pattern of induced forgetting.

Although these studies suggest that any shift in memory accessibility due to social contagion, practice, or RIF should affect the final judgment of a jury, again, this claim has not been explicitly studied in this setting.

Further investigations of practice effects and RIF

A trial usually proceeds with the presentation of the evidence, followed by biased summary statements, and then deliberation. This sequence could be viewed as involving a study phase (the presentation of the evidence), an initial social interaction involving a one-way exchange about what was previously studied (the summary statement), and, finally, a second social interaction among individuals who were exposed to both the original material and the biased presentation (the deliberation). Recently, Coman and Hirst (2010) studied how memories can be altered by such a sequence of exchanges. Their study is not an exact analog to a trial because the adversarial nature is not captured by the sequence they investigated. Moreover, they asked participants to learn arguments for and against the legalization of euthanasia, rather than to hear evidence. Finally, they examined the effects of attitudes. Judges, prosecutors, and defendants usually dismiss all potential jurors with strong attitudes toward the case or the issues involved in the case. It is difficult, however, to find individuals without a prior attitude, and hence the role of attitude on jurors' memory is relevant to any consideration of memory and jury decision-making.

As Figure 1 indicates, Coman and Hirst (2010) first assessed participants' attitude toward the legalization of euthanasia and then exposed them to a range of arguments for and against legalization. The arguments were grouped into general categories, e.g., scientific, legal, ethical. As a result, there was a category-exemplar structure to the material the participants studied. Following the study period, in what might be viewed as an equivalent to a speech, participants exposed participants to a biased slide presentation, for the slide show contained only arguments for euthanasia, and then, only a selected set of these arguments. Participants were told that a proponent of legalization prepared the slide presentation, whom we call PERSON-PRO. After the presentation was completed, Coman and Hirst then paired participants and asked them to discuss as many arguments for and against euthanasia as they could remember. They studied all possible configurations of attitude pairings. Following the conversation, there was an individual final recall test.

There are two social influences in this sequence: The presentation in Phase 3, and the conversation in Phase 5 (see Figure 1). Coman and Hirst (2010) considered the presentation in Phase 3 as a social influence because participants were told that a person put together the presentation to convey her views on legalization. In a way, the presentation is similar to a Powerpoint slide accompanying a summary statement. There are also three memory assessments (the pre-conversation individual recall, the post-conversation individual recall, as well as what is remembered in the conversation) and at least two attitude assessments (Phases 1 and 7). The first social interaction - exposure to PERSON-PRO's presentation - can affect all three subsequent memory assessments, whereas the second social interaction - the conversation - can affect only the post-conversation individual recall. Each of these social interactional effects on memory can be moderated by the attitudes of the participants. In the case of the lecture, the

content was always positive about legalization, whereas the participant attending to the presentation could be either for or against legalization. In the case of the conversation, what matters is the pairing of attitudes, with some pairs being homogeneous (Pro-Pro, and Anti-Anti), and others heterogeneous (Pro-Anti).

As one might expect, the results are complex, yet a few are quite relevant to our concerns here. First, when attitudes were moderate, Coman and Hirst failed to find an effect of attitude on practice effects or RIF, as assessed in the first, pre-conversational memory test. That is, the size of the RIF and practice effects elicited by PERSON-PRO was the same for attendees who agreed with the biased presentation in Phase 3 and for those who disagreed with it. This finding suggests that one person (the defendant's lawyer or the prosecutor) might be able to influence the memory of jurors, even in instances in which the jurors might be inclined to disagree with the sentiments of the summary statement.

Second, the effects of PERSON-PRO at the pre-conversational phase propagated into the conversation in a manner that depended on way the pairs were constructed. When the conversing members of a pair held different attitudes, the RIF and practice effects found prior to the conversation did not shape what was remembered in the conversation. Moreover, the pre-conversational effects did not, in turn, shape what was eventually remembered subsequent to the conversation, in the final memory assessment. In other words, when members of a pair had differing attitudes, their final recollections did not show the influence of PERSON-PRO. In terms of a trial, the efforts of the prosecutor and the lawyer for the defense to shape the memories of the jurors would probably fail if the jurors had differing attitudes.

But, as we noted, everything is done to ensure that jurors have neutral – in effect, similar – attitudes. Coman and Hirst (2010) found that when a pair with similar attitudes conversed the

RIF and practice effects observed in the pre-conversational memory test shaped what was remembered in both the conversation and in the final memory test. Moreover, the presence of RIF and practice effects in both the pre-conversational test and the conversation accumulated with their repetition, producing even greater RIF and practice effects in the final recall. These cumulative effects lead to a convergence of the homogeneous pairs onto the rendering of the original material expressed by PERSON-PRO. In terms of a trial, when jurors begin the trial with similar attitudes toward the issue raised by the trial, the presumably biased summary statement of the prosecutor or defendant may then shape both what is remembered in the deliberations and the memories that last beyond the deliberations. To be sure, both legal teams in a trial are competing to grab jurors' attention and their memory. The particular configuration of accessibility that they affect may be a complex combination of these individual influences. Whatever the result, Coman and Hirst's findings suggest that this combination may have a lasting effect, given the desired neutral attitudes of the jurors.

Concluding Remarks

Two impressions have emerged after this review of the psychological work on social aspects of memory as they apply to jury deliberations: First, the number of studies that specifically look at memory as it emerges during jury deliberation is small, making any strong conclusions difficult. But, second, and perhaps more critically, there is a growing body of research relevant to the issue of remembering during jury deliberation, even if it does not specifically test its hypotheses in the desired context. This work indicates that the Court's belief that juries should treat their collective memory as more reliable than, for instance, a written transcript must be carefully reconsidered. There is no reason to believe that twelve people working together to remember the testimony from a trial will remember it more accurately than

one person remembering on their own. The recollection will be selective, rarely, if ever, complete. This selectivity will reinforce some memories while simultaneously inducing forgetting in others. The final memory may not impact negatively on the jury's judgment, but it may. It is this possibility that Courts must work to avoid.

Is there anything in the literature reviewed herein that could help guide judges as they instruct jurors? It may not be enough to eliminate language that privileges collective memories over mnemonic technology. Rather, one must work toward obtaining more complete memories and less induced forgetting. Simple instructions about the risks of selective remembering may encourage jurors to remember more, but there is no guarantee their recollection would be complete. Moreover, as a result of the instructions, jurors may be more likely to forget the few unmentioned, but related items, in that the instructions may encourage them to more vigorously monitor for accuracy. More detailed instructions about the need for as broad a search as possible may eliminate induced forgetting as well, but there may be a limit here as well, especially if the testimony is long and complex. In the end, what the Courts seem to want to avoid – a reliance on mnemonic technology – may be preferable. Clearly, more research needs to be done to provide greater insight into the consequences of judicial instructions and the balance between a reliance on collective memory and the use of mnemonic technology.

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Table 1

Design of retrieval-induced forgetting experiments

<i>Study Phase</i>	<i>Practice Phase</i>	<i>Testing Phase</i>	<i>Condition</i>
Fruit – Apple	Fruit – Ap_____	List words paired with Fruit	Rp+
Fruit – Orange			Rp-
Vegetable – Broccoli		List words paired with Vegetable	Nrp
Vegetable – Pea			Nrp

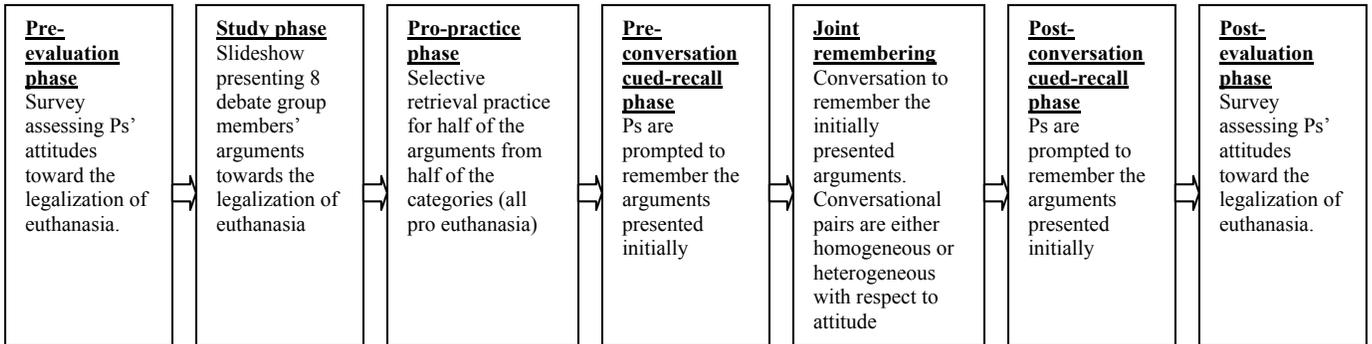


Figure 1: Phase of the procedure of an experiment studying mnemonic propagation (Coman and Hirst, 2010).