Eyewitness Memory Following Discussion: Using the MORI Technique With a Western Sample

MARYANNE GARRY1*, LAUREN FRENCH1, TONI KINZETT1 and KAZUO MORI2

1Victoria University of Wellington, Wellington, New Zealand
2Shinshu University, Nagano, Japan

SUMMARY
Researchers studying memory conformity have made significant advances in our understanding of the phenomenon, but have used methods with significant shortcomings. Mori’s three-stage method addresses many of these concerns. To date the technique has not been replicated on a Western sample. We present such a study, and discuss two significant improvements to Mori’s method. We found that subjects were more likely to report the correct answer for non-discussed critical details than discussed critical details. Our data also suggested that when subjects agreed with their partner’s information during the discussion, they did so because they thought that information was accurate; only a minority of the time did they go along with their partner during discussion and revert to their own answer at the test. We draw parallels between the unknown mechanisms driving memory conformity effects and the search for mechanisms driving the misinformation effect two decades ago. Copyright © 2007 John Wiley & Sons, Ltd.

Nearly every witness to a crime talks about it with another witness: Paterson and Kemp (2006a) found that when there was at least one other witness present, 86% of those who saw a crime or similar significant event unfold discussed the event with another witness. Naturally, this fact raises a concern for institutions—such as the legal system—that rely on witnesses to be independent. This fact also presents a challenge for scientists wanting to study what happens to memory when witnesses talk.

To study the effect of postevent conversation on memory, researchers must overcome two challenges. First, they must know what actually happened during the target event. Second, they must introduce conflicts into the postevent discussion so they can trace the effects of those conflicts on memory. Several laboratories have developed methods to address these challenges (for example, see Gabbert, Memon, & Allan, 2003; Gabbert, Memon, Allan, & Wright, 2004; Gabbert, Memon, & Wright, 2006; Hoffman, Granhag, See, Kwong, & Loftus, 2001; Paterson & Kemp, 2006b; Reysen, 2005; Roediger, Meade, & Bergman, 2001; Wright, Mathews, & Skagerberg, 2005; Wright, Self, & Justice, 2000). Their work has contributed to our understanding of the phenomenon of memory conformity, and shows that people can incorporate new and wrong information into their own memory during discussion with another person.

*Correspondence to: Maryanne Garry, School of Psychology, Victoria University of Wellington, P.O. Box 600, Wellington, New Zealand. E-mail: maryanne.garry@vuw.ac.nz

Copyright © 2007 John Wiley & Sons, Ltd.
Yet that work also has some undesirable methodological aspects. For example, some studies have examined the effects of conversation on subjects’ memories for word lists or pictures, memories that may be fundamentally different from their memories for complex events that unfold over time (see Gabbert et al., 2006; Reysen, 2005; Roediger et al., 2001; Wright et al., 2005; Wright et al., 2000). In other studies, subjects have watched different events on their own, and then have been brought back together to discuss what they have been led to believe is the same event (see Gabbert et al., 2003). People discuss their experiences as a way of creating an objective account of their shared past (Ross, 1997); the subjective experience of this situation is not captured as well by experiencing the same event (or what people believe is the same event) as another person while being separated from that person as it is by jointly experiencing an event together. Finally, some studies have paired subjects with a confederate (see Gabbert et al., 2004; Paterson & Kemp, 2006b; Reysen, 2005; Roediger et al., 2001), yet the introduction of confederates necessarily changes the rules of conversation while also constraining whatever sociolinguistic factors might contribute to later conformity. It is also worth noting that confederates are highly motivated to produce an effect.

In the study we present here, we attempted to build on the previous research by using a technique called the Manipulation of Overlapping Rivalrous Images (MORI technique; Mori, 2003, in press). We used a three-step procedure. First, pairs of people simultaneously and unwittingly watched different versions of a movie, showing an electrician who was repairing fixtures in a home while stealing a few items. Each version of the event was exactly the same except for certain crucial scenes. The crucial point is that two video projectors beamed two different versions of the movie onto the same screen. The images were polarised, so that one projector transmitted light waves on a vertical plane, while the other transmitted light on the horizontal plane. The subjects, who were told they were taking part in an experiment on visual acuity, wore polarising glasses that looked like ordinary sunglasses, but blocked out one of the projected versions of the film. Thus, with the MORI technique, people can sit side by side with someone who is watching a different movie, and believe they have both seen exactly the same thing. In the second stage, our subjects worked together to answer questions about what they saw; the questions guided them to discuss some conflicting details. Finally, they took an individual memory test.

The Western scientific community is only now beginning to adopt the MORI technique, a fact that is probably attributable to its long lag into English-language journals. Although the technique was first published a decade ago in Japanese (Kanematsu, Mori, & Mori, 1996), it did not appear in a widely available English-language journal until recently (Mori, 2003, in press; Mori & Kitabayashi, 2006). Moreover, two of these recent papers report the method itself, not a study based on the method, and—although the 2006 paper reports a study based on the method, as have numerous conference presentations—all of this work using the MORI technique has been based on data collected with Japanese subjects (e.g. Hirokawa, Matsuno, Mori, & Ukita, 2006; Itoh, 2006; Itoh, Umeda, & Kawaguchi, 2005; Mori, 2005; Mori & Kitabayashi, 2006). The concern that the MORI technique would not translate well to Western samples is not trivial: Japanese culture values conformity far more than Western cultures. In a recent analysis of socially desirable responding across cultures, Lalwani, Shavitt, and Johnson (2006) found that collective cultural orientation was associated with subjects striving to maintain social relationships and gain acceptance by conforming with others. In contrast, individualistic cultural orientation was associated with responding to emphasise self-reliance. Given the transparency of the MORI technique studies noted above, which require the Japanese subjects to create a unified report during...
discussion, it could be that the results thus far are due to response biases exacerbated by the cultural norms: Japan is widely cited as a country that places emphasis on collectivist values (e.g. Kowner & Wiseman, 2003; Sun, Horn, & Merrit, 2004; Wade-Benzi, Okumura, Brett, Moore, Tenbrunsel, & Bazerman, 2002). To our knowledge, the study we report here is the first experiment outside of Japan using the technique.

In addition, we improved on two methodological aspects of the MORI technique. First, rather than creating two versions of the same event by refilming, we filmed only one event, digitised it and edited it with software to create two versions that overlap completely except for the critical items (see Takarangi, Parker, & Garry, 2006). Second, because we had eight critical differences between the movie versions, we were able to employ a within-subjects design. Thus, for each subject, four of the critical items acted as discussed items, parallel to the ‘misled’ items in a misinformation study; the other four acted as non-discussed items, parallel to the ‘control’ items in a misinformation study. As a result, our subjects only had to complete one memory test for us to compare their memory of discussed and non-discussed items, rather than repeated tests separated by discussion. Unlike previous MORI technique experiments where memory for non-discussed items was based on subjects’ pre-discussion memory reports, our study provides a true discussed versus non-discussed item comparison, and was much less transparent than the earlier studies.

METHOD

Subjects

Forty students from an introductory psychology course at Victoria University of Wellington participated in pairs for course credit.

Design

The study was a within-subjects design and the critical items were fully counterbalanced so each served equally as a control and discussion item.

Procedure

Subjects were told that the experiment was about people’s sensory impressions at different levels of visual acuity. More specifically, we told them:

We are interested in people’s sensory impressions at different levels of visual acuity. Visual acuity basically means how well you can see. So, for example, right now you all should have 100% visual acuity either because your eyes work properly, or because you have correcting glasses on. We want to know what happens to people’s sensory impressions when their visual acuity is degraded by different amounts. Today, you will both be in the 95% visual acuity condition. I will give you each a pair of 95% acuity glasses, which will degrade your vision slightly. If you already wear glasses, the acuity glasses should fit over the top.

The polarising glasses were taken out of one box labelled ‘95% acuity glasses’, but to add authenticity to the cover story, other boxes were stacked next to that box, all labelled with different strengths of acuity glasses. In fact, the boxes were empty, and we always told
subjects that they would be in the 95% visual acuity condition. The experimenter then continued:

I am going to show you a short movie of a tradesman called Eric working in a house. Please make sure you watch the movie through the glasses (no peeking over the top or around the side) and keep your glasses on until I ask you to remove them. We find that people often see best when they keep their head straight rather than tilted.

Then subjects began the first of three phases. First, they watched a movie of an electrician (‘Eric’) working in an unoccupied house, where he digresses from his tasks, looks through some personal possessions and steals a number of items (adapted from Takarangi et al., 2006). The two versions of the movie are identical except for eight critical items, which have been digitally altered using Commotion© software. For example, in one version of the event, Eric tries on a black baseball cap, and in the other version he tries on a red baseball cap. The movie ran for 6 minutes 34 seconds, without audio. All subjects followed the instructions and kept their head straight during the movie.

Figure 1 shows the MORI technique. Each version of the movie was played on a separate Apple iBook 1.07 GHz PowerPC G4; each iBook was connected to a NEC ViewLight Mobile DPL projector, model LT75ZJ, and the two images were projected onto the rear of a semi-transparent projection screen. The two projectors were mounted in a stand, one above the other, with one tilted slightly upward and the other tilted slightly downward so that the two images overlapped. Polarising filters were attached to the stand in front of the lens of each projector, one placed vertically and the other horizontally. A 1.22 m × 1.82 m wooden panel had a 29 cm × 38 cm cutout holding the screen and hiding the two projectors from view. In each pair of subjects, one set of glasses allowed the wearer to view the vertically polarised image while blocking the horizontally polarised one, and the other set of glasses did the opposite.

After they watched the movie, subjects worked on a filler logic puzzle for 15 minutes, and then the second phase began. A set of 12 questions appeared on a screen, one at a time, and subjects were asked to discuss and then answer the questions together. Each question...
asked about a detail of the movie and suggested five alternative answers. For example, ‘Eric tried on a _____ cap: Blue; Black; Green; Red; Grey’.

Of the 12 questions, 4 targeted four of the eight critical details from the movie with both critical versions offered as answer alternatives, and the remaining 8 targeted filler details. The other four critical items from the movie were not discussed, and thus served as controls at test.

Pilot testing showed that people took approximately 30 seconds to discuss and answer each question. Thus, to give our subjects ample time while ensuring some consistency, we gave them up to 1 minute to discuss and produce an answer to each question. Subjects were reminded when they had 10 seconds left if they had not already answered it, but no one needed the full 12 minutes to discuss the questions. If subjects could not agree, they were permitted to give separate answers, although we did not offer this option unless it was clear that the subjects were having difficulty coming to an agreement.

At the end of this stage, subjects worked on long multiplication problems (3-digit by 3-digit) for 5 minutes, after which the third phase began. Subjects completed a surprise 20-item two-alternative forced choice recognition test. The test instructions read You will now be asked some questions about the video you saw. We are testing your memory for this video; this instruction was written at the top of the test and reiterated by the experimenter. Of the 20 items, 8 targeted memory for each of the eight critical items. The two alternatives were always structured so that subjects chose between the detail from their version of the movie and from their partner’s version, but of course these two choices were not labelled as such. The remaining 12 questions targeted new filler details, not those from the discussion. After each question, subjects used a scale to rate how confident they were that their answer was correct, where 1 = not at all confident and 5 = very confident. Afterwards, subjects were debriefed.

RESULTS AND DISCUSSION

The primary question in this study was whether discussion would affect memory for an ostensibly shared event. Before addressing this question, we first examined subjects’ memory for the 12 non-critical aspects of the movie; these details were the same in each version of the event. Subjects were equally good at remembering these details regardless of which version they saw, $M = 9.70$ (80%), $SD = 1.95$, $M = 9.15$ (76%), $SD = 1.46$, $t (38) = 1.01$, $p = .32$.

Before we could assess whether discussion affected subjects memories for the event, we had to take into account whether or not subjects were exposed to the misinformation during discussion. Whereas in misinformation effect and confederate discussion studies we can be certain that subjects are exposed to the misleading postevent information, in our study we relied on each subject to mislead the other, and they did not always do so. In fact, in total, subjects were exposed to the misleading postevent information only 81 out of a possible 160 times; we will refer to these details, where subjects were exposed to the misinformation, as discussed items. We use non-discussed to refer to control items, those items that subjects were not asked about at all during the discussion. Subjects were not always exposed to the same amount of postevent information, so in order to compare subject’s memories, we calculated a proportion score based on each subject’s discussed and non-discussed items. We compared the proportion of correct answers subjects gave on non-discussed items with the proportion of correct answers they gave on discussed items.
We now turn to the primary question: did discussion affect memory for an ostensibly shared event? The answer is yes. Figure 2 shows that at test, subjects were more likely to report the correct answer for non-discussed critical details than discussed critical details, $M = 0.79, SD = 0.17; M = 0.34, SD = 0.38$, $t (39) = 6.82, p < .01$, Cohen’s $d = 1.11$. Discussion did not affect subjects’ confidence that their answers were correct; confidence was similar for non-discussed and discussed items, $M = 3.50, SD = .71; M = 3.59, SD = 1.02$, $t (39) = 0.53, p = .70$. However, relying on misinformation had a cost: when subjects claimed to have seen a critical detail in the movie, they were more confident about their correct memories for non-discussed items than their false memories for discussed items, $M = 3.86, SD = 0.79; M = 3.45, SD = 1.05$, $t (32) = 1.85, p = 0.04$, Cohen’s $d = 0.32$.

Discussion factors

What effect did the nature of the discussion have on subjects’ later memory reports? There are several factors we considered.

First, recall that we could not control whether or not subjects actually reported the misleading information to each other during discussion. However, looking just at the 81 times that subjects were exposed to misinformation during discussion, they then went on to use that misinformation (rather than what they personally saw) as their answer at test 67% of the time. Subjects were more likely to use the misinformation as their final answer at test when they had previously agreed to it during discussion; when subjects conformed to their partner and agreed to use the misinformation as an answer during discussion, they also conformed at test 85% of the time; they agreed with their partner’s misinformation during discussion, but reverted to the correct detail at test the remaining 15% of the time. In other words, our data suggest that 85% of the time subjects agreed with their partner during the discussion, they exhibited informational influence, agreeing during discussion and incorporating their partner’s information into their own memory report because they believed their partner’s recall to be accurate and reliable. The remaining 15% of the time

1Effects sizes were calculated using G’Power v3.0 (Faul, Erdfelder, Lang, & Buchner, 2006).
subjects exhibited *normative influence*, and simply complied with their partner during discussion for social reasons, but reverted to their own answer in the independent test (see Deutsch & Gerard, 1955, for a discussion of these influences).

Second, Gabbert et al. (2006) have shown the first person to mention a critical detail at discussion ‘carries the day’ in the memory test, in that the first speaker is much more likely to influence the second speaker’s independent memory report than vice versa. However, when they removed speaking first from the analysis, the results showed that when subjects discussed contradictory details, they were more likely to conform to their partners answer if they did not dispute what their partner said than if they did dispute it. In order to determine if our data showed a similar pattern, we assumed independence of the 81 instances in which subjects were exposed to misleading information during discussion (Wright, 1998), and determined three factors for each instance: (1) if the subject spoke first during discussion of the critical item; (2) if the subject disputed what their partner said during discussion of the critical item and (3) if the subject agreed to use the misleading detail as an answer to the critical discussion question. Each of these three dichotomous factors was used in a nominal logistic regression to predict if the subject was eventually misled on that detail. We found that two factors predicted whether subjects would be misled: if they disputed what their partner said, $\chi^2 (1, N = 81) = 14.89, p < .01$, and if they agreed that the misleading information was correct $\chi^2 (1, N = 81) = 14.43, p < .01$. In fact, when subjects disputed the accuracy of misleading suggestions, they were 17 times less likely to be misled than if they did not dispute it, and when subjects agreed that the misleading information was correct, they were more than 21 times more likely to be misled than when subjects did not agree.

Our results extend those of Gabbert et al.’s (2006). Including the role of prior agreement in the analysis nullified the effect of speaking first. It seems that the two variables are not independent; our data showed that only 10% of the times subjects agreed to use the misinformation as an answer in discussion did they speak first; the remaining 90% of the time they spoke second. It could be that subjects were more likely to agree to use their partner’s answer when their partner spoke first either because of the primacy of the information, or because of the perceived authority of the person who asserted the information. We cannot distinguish between those two possibilities here. Either way, our results show prior agreement is a better predictor of later conformity than speaking first. Of course, our method was different to that used in Gabbert et al.’s study; in their study subjects were asked to discuss everything they could recall from complex scenes. It could be that the effect of speaking first in a natural conversation with no answer required is even more influential than speaking first in response to a discussion question, as the subjects in our study did.

Although our data show evidence of memory conformity, they do not tell us about the causes of it. In some ways, unanswered questions about these mechanisms parallel what two decades ago were unanswered questions about the misinformation effect (Belli, 1989; Loftus & Hoffman, 1989; McCloskey & Zaragoza, 1985). That is, memory conformity at test might mean that subjects genuinely but falsely remember seeing the inaccurate detail their partner told them about, or it might mean that subjects have simply capitulated, and decided to report their partner’s information even though they have no memory for it. The false memory mechanism might operate because when subjects hear their conversational partner’s description of a detail, they imagine it, and then confuse that imagined detail with reality, incorrectly deciding that they have seen something they only imagined. Of course, imagination might not factor at all: subjects might simply confuse what they remember
hearing their partner say with what they remember seeing. Either process fits with the
source-monitoring framework (Johnson, Hashtroudi, & Lindsay, 1993). The capitulation
mechanism might operate because subjects make a strategic decision that their partners’
memory is correct (Deutsch & Gerard, 1955).

Whether they experience actual memory distortion, or simply believe their partner to be
correct, our study shows that people will incorporate elements of each other’s memory
reports into their own memory reports, even when that information contradicts what they
personally saw, and even when there was no requirement that they agree to their partner’s
responses. Given how much people talk about their experiences, and given how much we
rely on witnesses’ memory reports to establish objective truth, it is crucial for future
research to focus on finding the conditions under which people will be more and less
influenced by what other people say. For example, does our relationship to the person we
have a discussion with affect how much we are influenced by what they say? Future
research could compare people who know each other very well (for example romantic
partners or immediate family members) with people who know each other less well or not
at all, to see what happens when they discuss an event together. We believe the MORI
technique provides an excellent means to conduct such research.

ACKNOWLEDGEMENTS

We are grateful for the support of the New Zealand Government through the Marsden Fund,
administered by the Royal Society of New Zealand on behalf of the Marsden Fund Council.
This research was supported by a Grant-in-Aid from the Japanese Ministry of Education,
Culture, Sports, Science and Technology (Grant No.16330139) to KM. LF is supported by
a Victoria University Postgraduate scholarship. Our thanks to Dan Wright for advice
regarding statistical analysis and Matthew Gerrie for comments on an earlier draft of this
manuscript.

REFERENCES

Belli, R. F. (1989). Influences of misleading postevent information: Misinformation interference and
Deutsch, M., & Gerard, H. B. (1955). A study of normative and informational social influences upon
other’s memories for an event? *Applied Cognitive Psychology, 17*, 533–543.
Gabbert, F., Memon, A., Allan, K., & Wright, D. B. (2004). Say it to my face: Examining the effects
Hirokawa, K., Matsuno, E., Mori, K., & Ukita, J. (2006). Relationship between masculinity-
femininity and concession in an experimental collaborative eyewitness testimony. *Asian Journal


Mori, K. (in press). A revised method for projecting two different movies to two groups of viewers without their noticing the duality. *Behavior Research Methods.*


