I still think it was a banana: memorable 'lies' and forgettable 'truths'

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Abstract

Interpersonal influences on cognition can distort memory judgements. Two experiments examined the nature of these 'social' influences, and whether their persistence is independent of their accuracy. Experiment 1 found that a confederate's social proximity, as well as the content and the confidence of their utterances, interactively modulate participants' immediate conformity. Notably, errant confederate statements that 'lied' about encoded material had a particularly strong immediate distorting influence on memory judgements. Experiment 2 revealed that these 'lies' were also memorable, continuing a day later to impair memory accuracy, while accurate confederate statements failed to produce a corresponding and lasting beneficial effect on memory. These findings suggest that an individual's 'informational' social influence can be selectively heightened when they express misinformation to someone who suspects no deceptive intent. The methods newly introduced here thus allow multiple social and cognitive factors impinging on memory accuracy to be manipulated and examined during realistic, precisely controlled dyadic social interactions.

Keywords: social cognition, memory, conformity

PsycINFO Classifications:-

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3040 Social Perception and Cognition

Introduction

Bartlett (1932) famously emphasised the importance of 'social' influences on remembering almost three-quarters of a century ago. However, only recently has there been a revival of interest in the effect that the views and judgements of others can have on the accuracy of an individual's own memory. Laboratory-based work on eyewitness testimony has produced a number of studies revealing that social influences generate 'misinformation' effects, i.e. systematic memory distortions (e.g., Betz, Skowronski & Ostrom, 1996; Gabbert, Memon, Allan & Wright, 2004; Meade & Roediger, 2002; Schneider & Watkins, 1996; Shaw, Garven & Wood, 1997; Walther, Bless, Strack, Rackstraw, Wagner & Werth, 2002; Wright, Self & Justice, 2000). This literature has repeatedly demonstrated that responses in joint recall and recognition tasks are highly malleable, often exhibiting conformity to the suggestions or judgements of others (Schneider & Watkins, 1996; Shaw et al., 1997; Wright et al., 2000). Discussions between participants, following the encoding of material, can also produce significant conformity in responses on subsequent memory tests that they perform alone (e.g., Gabbert, Memon & Allan, 2003; Gabbert, Memon & Wright, in press; Mori, 2003; Wright et al., 2000).

Social influences to conform are powerful, in that they can produce higher levels of memory distortion (Gabbert et al., 2004; Meade & Roediger, 2002) than the post-event narratives that are more commonly employed as a vehicle for misinformation. But the influence exerted by one person upon another's memory judgements can also be modulated by person perception factors. For example, tendencies to conform can be increased (or decreased)

by manipulating the perceptions of a pair of participants about the relative knowledge each has of stimuli they encoded together as a dyad (Gabbert et al., in press). Similar effects can be obtained by manipulating the perceived relative competence of each individual (e.g., Kwong See, Hoffman & Wood, 2001), or by manipulating the overt confidence with which individuals make their assertions to each other (e.g., Schneider & Watkins, 1996; Wright et al., 2000). But how these person perception manipulations alter the social influence exerted by one individual upon another is essentially unknown. Furthermore, research has not yet addressed whether such person perception factors can exacerbate, reduce or possibly eliminate the longer-term effects of immediate conformity upon memory.

Progress in addressing such issues has been hampered partly by the complexity of the phenomenon itself, due to the inherently dynamic and variable nature of realistic interactions between individuals. During such interactions, it is likely that heterogeneous motivations to conform may be triggered (reviewed recently by Cialdini & Goldstein, 2004; and see Deutsch & Gerard, 1955). Moreover, these motivations to conform may be modulated in their strength by various factors that need not operate with stability or consistency throughout the entire interaction. For example, the quality of information that a person is able to retrieve from their own memory may modulate their willingness to conform. Similarly, motivations to conform during an interaction may be influenced by each actor's impression of the other's memory, which also could change as their encounter proceeds. In order to understand the conformity phenomenon further, in terms of the social cognitive factors on which it may depend, the present two experiments

introduce a novel method that produces a realistic illusion of social interaction between two individuals, allowing conformity to be robustly generated and subjected to various manipulations.

Each participant is asked to study a series of stimuli (in the present two experiments we used pictures depicting household scenes taken from Roediger, Meade & Bergman, 2001). This study phase is undertaken with an experimental confederate who sits next to the participant. The participant is then taken to an experimental booth, and is instructed that the same is happening to the confederate, and that their memory for the recently encoded materials will now be tested. Here, we used a 2-alternative forced-choice recognition task, which the participant thinks they will perform along with the confederate. It is straightforward to define various 'rules' or contingencies (including those developed in research on economics and game theory, see Feyr & Fischbacher, 2003) according to which this joint memory task is to be conducted. In the present two experiments, we utilised an order-of-response manipulation whereby the participant was asked always to respond after they heard the confederate's answer. By these means each participant was led to believe that they and the confederate were sharing their knowledge of the pictures with one another.

A key manipulation involves the confederate's answers, which actually comprise a set of pre-recorded auditory samples held in .WAV files. This provides us with complete trial-by-trial control over the accuracy, content, tone and phrasing of the confederate's 'post-event information' (PEI), which allows their 'influence' to be systematically and very flexibly manipulated either within or across participant groups. Moreover, because participants are led to

believe that they are having an actual interaction with another person, attributes within interpersonal interactions that are conveyed vocally can easily be manipulated to study their modulatory effect on memory conformity. As a further example, these methods would also allow the confederate's character traits to be revealed to the participant, or systematically manipulated, at any point prior to, during or after their social interaction.

Using these methods, for Experiment 1 we had two specific goals. First and foremost was to determine whether the use of auditory confederate samples produces a compelling illusion of social interaction and, consequently, conformity. Across two groups of participants, we manipulated the social 'proximity' (e.g. Latane, 1981) of the source of influence. One group of participants encoded the picture stimuli along with the confederate, and were then tested under the collaborative conditions described above. For comparison, a second group of participants encoded the pictures on their own, and then performed the forced-choice task under identical test conditions, except that the PEI was understood to be the pre-recorded responses of a prior participant. If the illusion of social interaction works as intended, then we should obtain a far stronger effect of PEI on memory judgements in the confederate, compared to the no-confederate, encoding condition (Gabbert et al., 2004; Meade & Roediger, 2002). This would confirm that our method exposes individuals to a potent social influence, over and above the effect of mere exposure to the information conveyed in the PEI samples.

Secondly, Experiment 1 also addressed whether these methods can be used to vary and control person perception effects that may modulate the

strength of conformity. To achieve this we manipulated our participants' perception of the confederate's confidence on a trial by trial basis, utilising pre-recorded samples that expressed PEI with phrasing and tone suggestive either of low or high confidence. Orthogonally, we also manipulated the accurate or errant status of the PEI's content. In line with the person perception work described above, the confederate's confidence levels should modulate the conforming influence that they exert. Experiment 1 also allowed any interactions between the effect of confederate confidence, the accuracy of their PEI, and the between-group proximity manipulation, to be revealed.

Experiment 1

Method

Design

We employed two participant groups, one of whom encoded material (see below) alongside an experimental confederate, while the other group encoded material on their own. Subsequently, auditory samples recorded in the confederate's voice were played to the participants in each group, on each trial of a two-alternative forced-choice recognition tasks. These samples expressed either accurate or errant judgements, using a phrasing that indicated either high or a low confidence. The encoding conditions were therefore manipulated between participants, while the post-event-information (PEI) accuracy and confidence was manipulated within each group.

Participants.

Fifty-one first year psychology students received course-credit in return for participation. Twenty-six participants took part in the Confederate Encoding condition. The remaining 25 in the No-Confederate Encoding condition (18-20 years; M = 19.18; SD = 2.11).

Materials

One confederate, a young adult male (23 years old) was employed for the experiment. Sound samples from the confederate were held in a set of stereo .WAV files (sampled at 44.1KHz) that were recorded in a sound attenuated booth and edited using a standard freeware .WAV file-editing tool. The confederate provided four alternative answers for each of 180 forced-choice recognition questions that we constructed for the Roediger et al. (2001) picture stimuli (30 questions for each of the six images). For example, in response to the question “What type of fruit is in the picture: BANANA or APPLE?”, the confederate recorded each of the following response alternatives; a) “I’m sure it was a banana”, b) “I’m not sure but I think it was a banana”, c) “I’m sure it was an apple”, and, d) “I’m not sure but I think it was an apple”. The exact wording of the high and low confidence samples was varied to provide a set of responses with ‘natural’ variation; i.e. variation that would occur if a series of such responses had been generated spontaneously. We recorded a number of versions of confident and unconfident accurate and errant samples of PEI for each of the 180 forced-choice recognition questions. Subsequently we selected from these samples according to the sound quality

of the recording and also where the voice best expressed high or low confidence. This resulted in a final set of 720 sound files. All stimulus presentation at study and at test was controlled by software written in PCL, the scripting language of Presentation (Neurobehavioral systems, Inc).

Each participant studied six images of complex household scenes depicting a kitchen, bathroom, bedroom, closet, toolbox, and an office (Roediger et al., 2001). The order in which the scenes were presented was uniquely randomised for each participant. All participants were made aware when they first arrived at the laboratory that the experiment tested memory for these scenes. As noted above, we constructed a set of 30 questions probing details in each of the six scenes that were suited to a forced-choice recognition format. Thus, in total, we employed 180 questions at test. Thirty-six of these were presented with no accompanying confederate PEI. Seventy-two were presented with accurate PEI (in other words, the confederate sample gave the correct answer to the question). The remaining 72 questions were presented with errant PEI. Half (i.e. 36) of each of the accurate and errant PEI samples expressed high confidence, and half expressed low confidence. The mapping of PEI-type and confidence to each of the 180 questions was counterbalanced across participants. Of the two forced-choice alternative answers given on each trial, one was always correct and one was always wrong. The side of the screen on which the correct answer was presented was randomised from trial to trial. A strictly chance level of correct performance in each condition was 50%.

Procedure

Each image was presented on a computer screen for two minutes, during which time the participant (and confederate if present), were instructed to commit as much detail as possible to memory. At the end of the study phase, which lasted for 12 minutes, participants in the Confederate Encoding condition were told that they would now take part in an interactive memory test. This would involve the participant and confederate communicating their answers to one another via an intercom. Each was instructed to perform the recognition task to the best of their ability. The participant was then taken to an experimental booth, and was led to believe that the confederate was being taken to another identical booth in another room adjoining the laboratory. In the No-Confederate Encoding condition, following the study phase participants were instructed that their memory would now be tested for details in the scenes and they were then taken to the experimental booth.

Participants were then given instructions for the forced-choice recognition test. Participants were told that this was a computer-based task, where they would see the title of one of the six encoded scenes (e.g., 'BATHROOM') which would appear on the monitor in front of them for two seconds, followed by a question relating to that scene for which they would have to select the correct answer from two alternatives (e.g. "Were the blinds OPEN or CLOSED?"). The questions about each of the different scenes were presented in an order uniquely randomised for each participant. Participants in the Confederate Encoding condition were informed that they would take it in turns to tell the confederate their own recognition response, and would also

have to record their answer using left and right computer mouse buttons. At this point the experimenter flipped a coin to (falsely) determine who was to provide their recognition response first. This role was always given to the confederate. To support the façade of an interaction, the confederate said a few words to each participant in the Confederate Encoding condition via the intercom system before the recognition phase began. The confederate was then able to leave.

Participants in the No-Confederate Encoding condition were informed that prior to recording their recognition response using the computer mouse, they would hear recordings of the recognition judgements from a previous participant. Following this, they were to provide their own verbal response. They were further instructed that their response would be recorded and played to the next participant. This further instruction ensured that participants in the no-confederate group, as for the confederate encoding group, believed that their responses would be heard by another person.

The detailed structure of each test phase trial was as follows. A title of a scene appeared on screen for two seconds to inform participants which of the six scenes they were about to be questioned on. The question, along with two response alternatives, then replaced the scene title on the screen for five seconds. Participants were aware that they were going to hear the PEI prior to providing their own verbal and mouse-button responses. The exact timing of the confederate sample on each trial was randomly jittered to produce a naturalistic effect. The jittering meant that the sample was played between two and four seconds after the question was displayed. During this time either

an accurate or an errant, confidently or unconfidently delivered answer was played to the participant.

During one fifth (i.e. 36) of the trials, participants did not hear any response from the confederate. However, they were instructed before the recognition test began that occasionally the confederate/previous participant may not give an answer, e.g. they may not have come to a decision quickly enough within their allocated 5s response interval. As soon as this interval had passed, a question mark appeared on the monitor screen to prompt the participant to verbalise his or her own recognition judgment. Once the participant had verbalised their recognition judgment, they pressed either the left or the right mouse button to indicate which of the two forced-choice alternatives they endorsed, and this button press also initiated the next trial. The average duration of the recognition phase was 40 minutes, including two short rest breaks one third and two thirds of the way through. Participants were all fully debriefed at the end of the test phase.

Results and Discussion

Participants' answers to the debriefing questions confirmed that the façade of social interaction had worked as we intended in the Confederate Encoding condition. In fact, all Confederate Encoding participants were surprised to hear that they had not been interacting 'live' with the confederate, to the extent that some were mildly embarrassed at having occasionally embellished their answers to the confederate, conversationally, during the test phase. Thus, no participants were excluded on the basis of their having insight into

the experimental manipulation and we are accordingly confident that the methods reliably generated a compelling illusion of social interaction.

The proportion rates for accurate responses in each group of participants (Confederate and No-Confederate Encoding) following each type of PEI are given in Table 1. Initial analyses by t-test were carried out on the accuracy scores in each condition to determine first of all whether performance was reliably higher than the chance level of 50%. In the Confederate Encoding condition, performance in all conditions was reliably higher than chance (minimum t (25) = 8.39), with the exception of the two errant PEI conditions (confident errant: t (25) = .01, ns; and unconfident errant: t (25) = 1.9, p = 0.066). In the No-Confederate Encoding condition, performance in all five conditions was significantly higher than chance (minimum t (24) = 5.53).

[Table 1 here]

To determine whether the presence of the confederate had an impact on the information that participants gained during the study phase, we contrasted the baseline accuracy rates in each group (i.e. performance on trials where no PEI was presented). There was no detectable difference between the two encoding groups in their baseline performance (t (49) < 1). This is an important result because it shows that the presence of the confederate during encoding did not in itself either enhance or decrease participants' accuracy.

Because baseline performance was equivalent across groups, and also to focus analyses on the effect of PEI, we subtracted the baseline accuracy score from that following presentation of PEI in each of the remaining four conditions for both groups of participants (see Fig. 1). These baseline-corrected data were then analysed using a 2 (encoding; confederate vs. no-confederate) by 2 (PEI; accurate vs. errant) by 2 (confidence of confederate; confident vs. unconfident) mixed design ANOVA.

We obtained a main effect of PEI ($F (1, 49) = 38.21$, $MSE = 10089.57$, $p < .001$, $\eta^2 = .44$), but no main effect of confidence ($F (1, 49) = .63$, $MSE = 29.42$, $p = .43$, $\eta^2 = .01$). Significant interactions were revealed between PEI and encoding condition ($F (1, 49) = 12.44$, $MSE = 3285.69$, $p = .001$, $\eta^2 = .23$) as well as between PEI and confidence ($F (1, 49) = 6.94$, $MSE = 480.85$, $p = .01$, $\eta^2 = .12$). These main effects and two-way interactions were accompanied by a significant three-way interaction involving all factors ($F (1, 49) = 11.03$, $MSE = 763.98$, $p = .002$, $\eta^2 = .18$).

- Fig. 1 about here –

Follow-up subsidiary pairwise t-tests, used to elucidate the three-way interaction, revealed qualitative differences in the effect of PEI on the confederate and the no-confederate encoding groups. Participants in the Confederate Encoding condition were significantly more accurate (in comparison to baseline) when receiving confidently expressed and accurate PEI from the confederate ($t (25) = 4.38$, $p < .001$, $\eta^2 = .45$). However,

encountering unconfidently expressed accurate PEI from the confederate did not improve accuracy above the baseline score ($t(25) = .26$, $p = .80$, $\eta^2 = .002$). Encounters with errant PEI significantly decreased accuracy relative to baseline regardless of the confidence of the confederate ($t(25) = 7.28$, $p < .001$, $\eta^2 = .69$, and, $t(25) = 4.97$, $p < .001$, $\eta^2 = .51$, for confidently and unconfidently expressed PEI respectively). In marked contrast to the systematic influence exerted by PEI during a social interaction, the only significant PEI effect in the No-Confederate Encoding condition was enhanced accuracy when receiving unconfident but correct PEI ($t(24) = 2.26$, $p = .03$, $\eta^2 = .18$). No other significant effects of PEI could be found (highest $t(24) = 1.50$, ns). On application of the Bonferroni-type correction to control type-1 error-rates under multiple comparisons, all of these follow-up t-test results remained significant, with the sole exception of the result from the no-confederate condition.

To determine the specific effect of confidence expressed in the confederate samples per se, two further t-tests were carried out on the raw (i.e. not baseline corrected) accuracy scores in each participant group. These confirmed that although confidence in the pre-recorded samples exerted robust effects on accuracy regardless of whether the PEI was accurate or errant, this occurred only in the confederate-encoding group. Thus, high-confidence PEI elicited significantly stronger conformity than low confidence PEI (accurate PEI: $t(25) = 4.64$, $p < .001$, $\eta^2 = .47$; errant PEI: $t(25) = 2.05$, $p = .05$, $\eta^2 = .15$). However, the same contrasts on the no-confederate encoding group failed to produce significant effects (all t's (24) < 1).

The findings of Experiment 1 show that conformity in memory judgements occurs only when participants believe that they and the confederate have engaged in a live social interaction. Moreover, within a social context, the confidence of the confederate's utterances appears to have operated systematically as a cue that promoted conformity. However, in comparison to baseline performance where no PEI was encountered, the effect of confidence differed for accurate and errant PEI. Conformity to errant PEI reduced performance levels to the extent that they dropped to chance both for the low and the high confidence samples. This immediate 'impairing' effect of errant PEI on accuracy was significantly stronger for the high compared to low confidence samples. But in the accurate PEI conditions, an effect on memory judgements (i.e. an increase) was only exerted by high confidence samples.

It appears therefore that errant PEI exerts an effect that can be enhanced by, but is not dependent on, the confidence with which it is uttered. It is also worth mentioning that relative to the 70% baseline performance level, the effect of confident errant PEI on recognition (i.e. a 20% reduction) was roughly twice as large as the effect of confident accurate PEI (i.e. a 9% increase). Although a ceiling effect may have limited accurate PEI's ability to spuriously increase performance, we consider this to be unlikely since the 70% baseline level allows, at least numerically, for an increase of 30%, which is considerably larger than the actual observed effect of errant PEI.

PEI in the no-confederate encoding condition, even when expressed with high confidence, failed to exert a systematic effect on the no-confederate participants' performance. Baseline performance (i.e. when no PEI was given)

was, however, statistically identical in both groups of participants. This is an important result because it strongly suggests that the mere presence of the confederate at encoding was insufficient to alter the way in which the images were processed. For example, encoding with the confederate could have prompted participants to engage greater attention or to make more effort, which could as a result have elevated memory. Or, the presence of the confederate could have encouraged participants to make rather less effort to encode detail (see Chapman et al., 1993), and as a result memory would have been relatively poorer compared to the no-confederate encoding participants. However, we could find no evidence of either effect in the baseline data, and so we conclude that the marked differential effect of PEI in each group was not due to how the material was encoded.

The absence of systematic PEI and confidence effects in the no-confederate condition was quite unexpected on the basis of prior work (see Gabbert et al., 2004; Meade & Roediger, 2002; for a review of the misinformation literature see Ayers & Reder, 1998). It is possible, however, that a number of factors operating during retrieval may have contributed to the absence of any systematic pattern of conformity in this group of participants. It is worth noting that here we have used a two-phase design, where participants encode material and then encounter PEI while performing the memory test. Typically in studies of misinformation effects and PEI, a three-phase design has been used where encoding occurs first, then PEI is introduced and then memory is tested. It is possible that this difference in design may have played some role here in weakening participants tendency to use the PEI in the no-confederate condition.

Other more specific factors operating in the present experiment may also be raised to account for the lack of conformity in the no-confederate condition. First, participants were quite obviously aware that there was no partner present to hear or react to their recognition judgements. Any desire to conform to another person's utterances for purely normative goals, such as affiliation, to reduce disagreement or to project a favourable self-image (Cialdini & Goldstein, 2004), should therefore have been minimal or entirely absent. Moreover, as dictated by the current experimental design, the overall probability of a correct response from the confederate was only 0.4. In other words, their responses were correct on two fifths of the trials, incorrect on another two fifths, and on the remaining fifth no confederate response was presented at all. Hence, encountering a high proportion of error, and lacking any social motivations to conform, while moreover believing that their responses were being recorded, it is perhaps not surprising that very little conformity was evoked. These considerations also serve to emphasise the power that social influence had in the confederate encoding condition to elicit overt changes in memory judgements.

Experiment 2

Prior work on conformity has indicated that persistent after-effects of social influence can be detected as much as 48-hours later (Shaw et al., 1997, Experiment 3). Shaw et al. (and see Betz et al., 1996) have argued that to persist for so long, conformity would most likely derive initially from a strong 'informational' motivation. In other words, by actively comparing their own memory against the content of the PEI they encounter, participants may be

led to question and to change their mind over what has actually taken place. In addition to this informational motivation, which may be associated with persistent memory distortions, conformity may also be motivated 'normatively', from each individual's desire for social approval. Such approval can result in compliance, where an individual conforms to others based on affiliation-oriented goals; i.e. to appear to be similar to another person or group of individuals (e.g. see Deutsch & Gerard, 1955; Tajfel & Turner, 1986).

Hence, if conformity to accurate and errant PEI under the present experimental design is informationally motivated, then we would expect there to be a significant longer-term impact of encountering PEI on memory judgements, long after the social interaction has terminated. Furthermore, and crucially, we hypothesise that normative motivations to conform are likely to be equivalent whether PEI is accurate or errant in nature. This equivalence can be safely assumed because all PEI, regardless of its status, originates from the same proximal source (i.e. the confederate). This equivalence cannot be assumed, however, with respect to informational motivations to conform, so long as participants actively compare their own memories with the content of the PEI. If they do so, differences in the informational social influence exerted by accurate and errant PEI may begin to emerge. This differential informational influence could arise because the errant PEI is inherently and systematically contradictory in relation to what was actually experienced. Whereas in contrast, the accurate PEI systematically acts to confirm the participants' own recollections, when these are accurate.

The disconfirming or confirming nature of the PEI can only become apparent to the participant to the extent that they are able to retrieve related

details from their own memory. Hence, our hypothesis that misinformation can exert an increased informational social influence is predicated on the assumption that participants engage in active comparison between the PEI and the products of searches in their own memory. On trials where retrieval fails or is not attempted, which could also lead to immediate conformity (e.g. via social loafing, see Chapman et al., 1993; Latané, Williams & Harkins, 1979), accurate and errant PEI would not produce a differential informational influence in the sense meant here. It is worthwhile noting that the detection of PEI content that is discrepant with participant's memory for encoded material, could reduce the misinforming effect of errant PEI (see Tousignant, Hall, & Loftus, 1986)[1]. However, we found in Experiment 1 that the errant PEI actually exerted a more powerful effect, in the sense that it affected performance even when it was expressed with low confidence, which was not true of accurate PEI.

The hypothesis of relatively increased informational influence for errant compared to accurate PEI, predicts that the *impairing* effect of errant PEI should significantly outlast the *enhancing* effect of accurate PEI. The aim of Experiment 2 was to test this prediction, and therefore determine whether the conformity produced during our simulated social interaction is associated with a lasting alteration to memory. This is a fundamental issue, with obvious relevance not only for the applied forensic setting, but also for our theoretical understanding of the social cognitive processes that cause conformity. To test the prediction, we carried out a stripped-down version of Experiment 1, employing the confederate encoding condition where PEI systematically

[1] We thank an anonymous reviewer for pointing out this possibility.

affected performance. We also used just the high-confidence confederate samples, both to produce strong immediate conformity effects, and to increase our power to detect persistent effects of conformity in a follow-up memory test given one day later.

Immediate conformity data was therefore collected from a new group of participants, and then supplemented with data from the follow-up testing session one day later, where there was no actual or implied confederate presence. Performance on day 2 may then be examined in two complementary ways. First of all, we may examine whether exposure to accurate and errant PEI has produced a lasting mnemonic benefit or impairment, respectively, compared to items presented in the baseline condition where no exposure occurred to PEI. Secondly, we can examine day 2 responses to items that attracted, or did not attract, conformity on day 1. This further conditional analysis allows us to look specifically at any persistent effects (or lack thereof) associated with the act of conformity. Thus, if conformity to misinforming PEI on day 1 impairs performance on day 2, then we would predict that memory for the associated items would be disproportionately poor, relative to that for baseline items. Similarly, if conformity to accurate PEI boosts performance on day 2, then memory for the associated items should be disproportionately enhanced, relative to that for baseline items. Hence, if conformity on day 1 does alter performance on day 2, regardless of the accuracy of the PEI, then our hypothesis may be rejected. But, our hypothesis would be supported if we observe that a significantly stronger alteration of day 2 performance results from conformity to errant versus accurate PEI.

Method

Participants

Twenty-two first year psychology students received course-credit in return for participation (18-25 years; M = 19.09; SD = 1.90).

Procedure

The same procedure as for the Confederate Encoding condition in Experiment 1 was followed. During the retrieval phase on day 1, the high confidence PEI sound samples were employed, such that on sixty test phase trials accurate PEI was given, on sixty trials errant PEI was given, and on the remaining sixty trials no PEI was given (i.e. baseline trials). At the end of the retrieval phase, participants were reminded that they had to return to the laboratory the next day. The participants were told that they would be carrying out standardised neuropsychological measures of memory and IQ and were not informed that the second day's testing would involve material learned on the first day. On day 2, participants were informed that they would actually be completing the two-alternative forced-choice recognition test again. Participants were asked to respond as accurately as they could based on their memory of the slides' content, and were informed that they would be performing the test on their own without any input from the confederate. Thus, on day 2 no PEI samples were played to the participant. At the end of the recognition test, participants were fully debriefed.

Results and Discussion

As was the case in Experiment 1, debriefing revealed that participants expressed no insight into the PEI manipulation given on day 1. The group, without exception, expressed surprise that the interaction with the confederate on day 1 had been artificially generated.

Table 2 depicts performance measures on immediate (day 1) and delayed (day 2) testing. Performance on the immediate test phase of day 1 closely replicates the pattern observed in Experiment 1. As in Experiment 1, we first determined whether correct performance was significantly higher than chance levels. This was true on day 1 of all conditions (minimum $t(21) = 10.52$) apart from that of errant PEI ($t(21) = .91$, ns). Performance at day 2 was significantly higher than chance levels in all conditions (minimum $t(21) = 4.29$).

- Table 2 about here –

On day 1, correct recognition occurred more frequently when receiving accurate PEI, and significantly less often when encountering errant PEI, in comparison to baseline ($t(21) = 3.21$, $p = .004$, $\eta^2 = .34$, and, $t(21) = 3.82$, $p = .001$, $\eta^2 = .42$, respectively). On day 2, performance on errant PEI items was significantly higher than that observed on day 1 (see Table 2, mean improvement was 8%, $t(21) = 2.16$, $p = .04$, $\eta^2 = .19$), however correct responses were still significantly below the day 2 baseline level ($t(21) = 2.85$,

p = .01, ŋ² = .29). For accurate PEI items, correct performance on day 2 was significantly lower than that observed on day 1 (see Table 2, mean drop in performance was 12%, t (21) = 5.37, p < .001, ŋ² = .59), to the extent that it no longer differed from the day 2 baseline level (t (21) = .18, p = .86, ŋ² = .001). It is notable that performance on baseline items was unchanged from day 1 to day 2 (t (21) = .17, p = .87, ŋ² = .001).

The pattern of correct responses on day 2 shows that there is a persistent after-effect of errant PEI but not accurate PEI. To further explore this pattern, we examined how performance on day 2 was related to conformity on day 1. In other words, we conditionalised day 2 performance on a per item basis according to how the participant responded to the item on day 1. These data are given in Table 3, which first of all shows the proportion of correct and incorrect responses on day 2 for baseline items as a function of judgements on day 1[2]. These baseline data provide us with a 'standard' against which to measure the effect of PEI. For example, according to the baseline data, 0.84 of correctly judged items on day 1 also receive a correct judgement on day 2. So, if the effect PEI has completely worn off by day 2, we would expect that a similar proportion (0.84) of items would receive a correct response.

In fact, the proportion of accurate PEI items attracting correct responses on both days was 0.77, which was significantly lower than the baseline expectation of 0.84 (t (20) = 4.79, p < .001, ŋ² = .55). This finding reveals that the participants were correct less often than we would expect,

[2] Backups of the data files from one participant had become corrupted and so we could not calculate their conditional probabilities. The measures in Table 3 therefore reflect the mean of the remaining 21 participants' scores.

given their 81% correct rate of responding on day 1. The clear implication is that conformity to accurate PEI was not associated with a sustained detectable impact (i.e. improvement) on memory a day later. Similarly, mere exposure to accurate PEI, without producing any conformity (i.e. recognition failure), was associated with a day 2 recognition failure rate of 0.37. The corresponding baseline proportion was 0.34 (see Table 3), which reflects the rate at which baseline items failed to be recognised on both days. Thus, if mere exposure to accurate PEI had some benefit for memory, then we might have expected a corresponding improvement in recognition on day 2, however the relevant proportions (0.37 vs. 0.34) did not differ significantly from one another ($t < 1$).

- Table 3 about here -

For the errant PEI items, the proportion attracting correct responses on both days was 0.86 (note that in this case the errant PEI was not conformed to on day 1). Thus, performance was only slightly better for these items than expected from the 0.84 baseline level, and not significantly so ($t(20) = 1.01$, $p = .33$, $\eta^2 = .05$). This finding also indicates that mere exposure to PEI, without immediate conformity to its errant content, does not lead to a detectable impairment of memory one day later. Of all the items that did attract conformity to errant PEI on day 1 (i.e. that attracted an incorrect response), proportionally 0.40 were correctly recognised on day 2. This proportion did not differ from the corresponding 0.34 proportion of baseline items that were

responded to incorrectly on day 1 but correctly on day 2 ($t(20) = 1.45$, $p = .16$, $\eta^2 = .10$). This is a crucial finding, because it shows that conformity to errant PEI on day 1 was not 'offset' by a detectable increase in correct recognition on day 2.

In summary, the pattern of performance on day 1 was very similar to that observed in Experiment 1 (compare Tables 1 and 2). Performance on day 2 in all conditions was significantly higher than chance levels. A persistent and significant lowering in the number of correct responses for items exposed to errant PEI was present at day 2 compared to performance on baseline items. However, items initially exposed to accurate PEI were recognised at baseline levels on day 2. These findings clearly demonstrate that the impairing effect of errant PEI did significantly outlast the enhancing effect of accurate PEI, as was predicted.

The analyses of day 2 performance contingent on day 1 performance, confirmed both the transient effect of conforming to accurate PEI and the more sustained effect of conforming to errant PEI. Conformity to accurate PEI, which elevated performance on day 1 beyond baseline levels, had worn off by day 2 when performance had dropped back to baseline. This strongly indicates that the elevation in correct responding in the accurate PEI condition on day 1 was not associated with an underlying enhancement in memory for scene details. In marked contrast, a return to baseline levels of performance was not the outcome of conforming to errant PEI. This would have manifested as improved proportional levels of correct recognition for items that had previously been responded to incorrectly (i.e. to accord with the errant PEI), but we could find no evidence of such an effect.

Resistance to errant PEI on day 1 could have occurred when participants were able to recall picture details with particular clarity. But, we could find no evidence of enhanced memory ability on day 2 for picture details that failed to evoke conformity on day 1. In other words, proportionally higher levels of recognition should have been evident on day 2 to errant PEI items that were not conformed to on day 1. In fact, we could observe no effects of mere exposure to either kind of PEI that persisted to day 2. In sum, it appears conclusively that sustained effects on memory were produced only with errant PEI items that attracted conformity on day 1.

The findings of Experiment 2 are thus entirely consistent with the hypothesis that conformity to errant PEI is strongly motivated by informational influences, as compared to the influences that tend to motivate conformity to accurate PEI. The potent impact of errant PEI on memory observed here is also consistent with previous findings on the persistent memory alterations that follow conformity (Shaw et al., 1997; see also Corey & Wood, 2002). But the present results show, additionally, that ‘true’ and ‘false’ statements from a single source of proximal social influence may elicit different motivations to conform, having radically different longer-term consequences for memory. It is particularly unfortunate and noteworthy that false statements of socially conveyed misinformation tend to ‘stick in the mind’, while true statements that express accurate information are quickly forgotten.

General Discussion

This paper has presented the findings from two experiments that produced highly realistic and precisely controlled social interactions leading to immediate memory conformity. Experiment 1 demonstrated that conformity to the utterances of a confederate only occurred when their 'influence' was encountered in the context of a live social interaction. When participants understood the utterances to be recordings from a prior participant, no systematic pattern of conformity was elicited. We suggested a number of factors that may have led participants to disregard the confederate's judgements (see discussion to Experiment 1), which led us to conclude that our methods induce a highly potent and overriding social influence to conform.

By a subtle manipulation of the confidence expressed in the confederate utterances, we were also able to systematically alter our participants' tendency to conform. Expressions high in confidence elicited significantly stronger conformity, regardless of whether their content was accurate or errant in nature. This effect indicates not surprisingly that a person's confidence in what they have to say can alter the immediate persuasiveness of its content. However, even errant misinforming utterances of low confidence were able to significantly impair participants' immediate judgements, which was not true of the low confidence accurate PEI. The different effects of accurate and errant PEI confidence imply that susceptibility to conformity depends on more than the perception of another person's confidence. It was hypothesised that active comparison between the content of PEI and the products of retrieval may confer a heightened informational influence upon errant PEI. This may arise because errant PEI systematically

contradicts the actual content of the pictures that the participants viewed with the confederate.

The hypothesis was supported by the findings of Experiment 2, which revealed that sustained alterations in memory judgements were only observed after encountering errant PEI. Hence, under the present experimental conditions, the longer-term impact of conformity on memory can be made to depend on what was communicated. If an utterance is misinforming (i.e. contradicts experience), then it is more likely to have a persistent effect on memory judgements, unlike the rapid forgetting of utterances that accurately reflect an experience shared by two individuals. These findings imply a very unfortunate outcome in forensic settings where witnesses express inaccuracies while discussing a crime. But as yet, differences in the longer-term impact of social encounters with accurate versus errant PEI have not received the due attention and further investigation that the present results perhaps justify.

Although we did not examine any person perception manipulations here, except for the confidence manipulation in Experiment 1, the present methods could provide a good means of doing so in future work. Most notably in our view, the present methods could examine how the longer-term impact of socially encountered PEI can be brought under control (i.e. eliminated or potentiated). For example, by altering the participants' view of the confederate's competence, personality or trustworthiness before, during or after they interact. It is tempting to speculate that the potency of the conforming influence during a social interaction, which here was sufficient to overcome the reticence observed in Experiment 1's no-confederate condition,

may partly reflect individuals' trust in one another. In particular, a trust that there are no intentions to deceive. If so, it would again be highly unfortunate if such trust tended to make covert 'lies' about the past more memorable than the truth.

The present methods are also flexible enough to allow various kinds of stimuli and memory task instructions to be employed. For example, it would be particularly insightful to use a source memory task (Johnson, Hashtroudi & Lindsay, 1993; see Betz et al., 1996) on day 2 to discover whether errant PEI corrupts participants' original memories of the pictures. Alternatively, participants may be aware on day 2 of what the confederate had said the day before, as well as of their own recollection of a picture. If so, they may on occasion have chosen to respond with the confederate's judgement rather than their own. They may have made this choice, on occasion, because of a continuation of the informational influence that prompted them to conform to the errant PEI on day 1. But if participants were occasionally able to remember what the confederate had said the day before, why would they choose to systematically disregard what was accurate, while continuing on occasion to use what was errant?

Perhaps the simplest account of the persistent errant PEI effect is that the contrast between one's own memory and the misinformation tends to increase the salience of the latter due to its contradictory or novel content. As already discussed above, errant PEI has the unique property that it can bring into question the remembered content of a past experience, whereas accurate PEI can by its nature only confirm participants' efforts to remember what they have experienced. Given the well-known importance of attention for encoding

processes in long-term memory (e.g., Naveh-Benjamin, Craik, Guez & Kreuger, 2005), any factor that tends to focus attention on the PEI and away from the participant's own memory would enhance the relative memorability of the PEI; hence, the unfortunate memorability of errant compared to accurate PEI may arise. This account is appealing because in effect it reduces the notion of heightened 'informational social influence', at least under the present conditions, to a difference in the attention and cognitive elaboration attracted by errant versus accurate PEI.

In conclusion, the present experiments succeeded in generating and modulating social influences that lead to immediate conformity and to longer-lasting alterations in memory accuracy. The methods introduced here capture and extend, within one approach, core phenomena from a disparate set of prior studies dealing with conformity, social influence and person perception. The present methods also offer a useful means in future work to control and to independently manipulate multiple social cognitive factors that determine individuals' susceptibility / resistance to each others' influence.

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Table 1. *Mean proportion of accurate responses in each condition of Experiment 1 (SD's in parentheses).*

		Confederate	
		Present	Absent
PEI	None (baseline)	.70 (.07)	.68 (.08)
	Confident/Accurate	.79 (.09)	.71 (.10)
	Unconfident/Accurate	.70 (.13)	.71 (.08)
	Confident/Errant	.50 (.15)	.65 (.12)
	Unconfident/Errant	.55 (.15)	.65 (.14)

Figure 1. *Mean Accuracy scores in each PEI condition from Experiment 1, corrected for baseline (no-PEI) performance.*

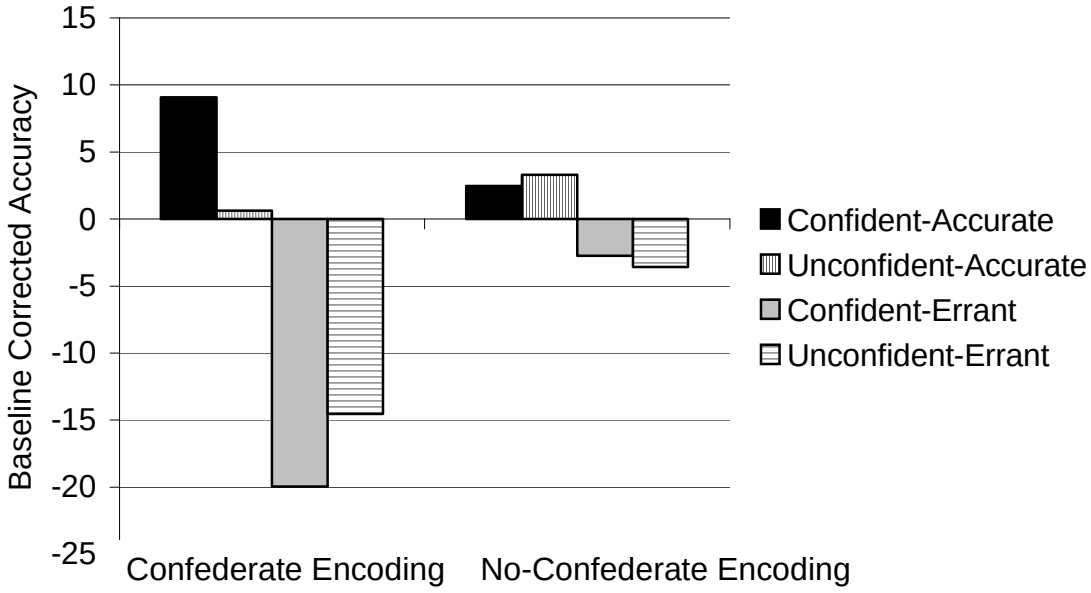

Table 2. *Mean proportion of accurate responses from each condition in Experiment 2 (SD's in parentheses)*

		Test Phase	
		Day 1	Day 2
	None (baseline)	.69 (.09)	.69 (.06)
PEI	Accurate	.81 (.13)	.69 (.07)
	Errant	.54 (.22)	.62 (.14)

Table 3. *Proportions from Experiment 2 of correct and incorrect responses on day 2, conditionalised on the response given to each item on day 1 (SD's in parentheses)*

	Test Phase			
PEI	Day 1		Day 2	
Baseline	Correct	0.69 (.09)	Correct	0.84 (.07)
			Incorrect	0.16 (.07)
	Incorrect	0.31 (.09)	Correct	0.34 (.16)
			Incorrect	0.66 (.16)
Accurate	Conform	0.81 (.13)	Correct	0.77 (.07)
	(correct)		Incorrect	0.23 (.07)
	Don't conform	0.19 (.13)	Correct	0.37 (.28)
	(incorrect)		Incorrect	0.63 (.30)
Errant	Conform	0.54 (.22)	Correct	0.40 (.06)
	(incorrect)		Incorrect	0.60 (.06)
	Don't conform	0.46 (.22)	Correct	0.86 (.11)
	(correct)		Incorrect	0.14 (.11)