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Abstract

Building on recent work which has investigated social influences on memory and remembering, the present experiment examined the effects of social pressure and confederate confidence on the accuracy and confidence of eyewitnesses. Sixty undergraduate participants watched a video of a staged mugging and then answered questions about the video out loud in the presence of either one or three confederates who had also watched the film with them. Unbeknownst to the participant, the confederate(s) always gave incorrect responses to four out of the eight questions. Participants and confederates were also asked to give confidence scores out loud for each of their answers. Again, unbeknownst to the participant, the confederate(s) always expressed either high or low confidence scores for the incorrect information, depending on condition. Participants gave fewer correct answers, and were less confident, in the presence of three, as opposed to one, confederate. Participants were also more confident, yet no more accurate, when the confederate(s) gave high, as opposed to low, confidence scores. Thus the presumed independence of evidence given by multiple witnesses cannot be safely assumed.

The effects of social influence and confident confederates on the accuracy of crime judgements.

The aim of this experiment was to examine whether confident co-witnesses (e.g., confederates) would lead witnesses to incorporate inaccurate information into their post-event recall of a criminal event. This is an important question because we know that eyewitnesses to criminal events frequently discuss the events that they have seen with other co-witnesses, prior to any statement being taken by police (Paterson & Kemp, 2006). The case reported by Memon and Wright (1999), surrounding claims of a second suspect in the Oklahoma bombing, highlights the negative impact that such discussions can have in real life forensic investigations. Partly as a result of these concerns, psychological research has focussed on the various effects that discussion, or social influence, can have on an individual's later memory performance. These include memory conformity (Gabbert, Memon & Allan, 2003; Granhag, Strömwall & Billings, 2003; Ost, Hogbin & Granhag, 2006; Wright, Self & Justice, 2000), collaborative inhibition (Andersson & Rönnberg, 1995), increased confidence in inaccurate details (Stephenson, Brandstätter & Wagner, 1983), or the likelihood of eliciting a false confession (Kassin & Kiechel, 1996) depending on the task being investigated. Research has highlighted a number of important caveats to these findings including the effects of the presence of dissenters (Walther et al. 2002) and the impact of postevent warnings (Echterhoff, Hirst & Hussy, 2005; Meade & Roediger, 2002).

Typically, psychologists have used one of two methods to address these issues. One body of research has attempted to model real life discussions using naïve co-witnesses (Gabbert *et al.*, 2003; Hope, Ost, Gabbert, Healey & Lenton, *under revision*; Wright *et al.*, 2000). This has the advantage of being more likely to capture

the dynamics of naturally occurring discussions amongst co-witnesses as they attempt to resolve what did, or did not, occur in a particular event. For example, Gabbert and colleagues (Gabbert, Memon & Wright, 2006) have shown that the co-witness who speaks first is likely to be the most persuasive. A second body of work has used confederates who are instructed to include misinformation in their reports of the witnessed event(s) during an initial recall task with the participant (e.g. Dalton & Daneman, 2006; Roediger, Meade & Bergman, 2001; Smith & Ellsworth, 1987). Often this method has been refined still further to the point where actual confederates are not present – they are either implied using experimental instructions (e.g. Echterhoff *et al.*, 2005) or presented to participants on video (e.g. Lampinen & Smith, 1995). The advantage of using either actual or implied confederates, as opposed to naïve co-witnesses, is that it allows a more straightforward analysis of causal relationships between certain variables (e.g. the credibility, status, or competence of the confederate) and the likelihood that participants will report the misinformation included in the confederate's account (Wright, Mathews & Skagerberg, 2005).

In the present experiment actual confederates were used because there is an additional cost in relying on implied confederates. As Gabbert and colleagues have demonstrated, misinformation presented by an actual confederate is more likely to be incorporated in participants' memory reports than misinformation presented in a narrative allegedly written by another witness (Gabbert, Memon, Allan & Wright, 2004). This suggests that social psychological processes, in addition to the usual cognitive judgments, come into play when participants make decisions about where or not to report misinformation (Blank, 1998; Bless, Strack & Walther, 2001; Walther *et al.*, 2002). Indeed from the work of Asch (1951) onwards we know that participants engage in various social comparison and self presentational strategies when

evaluating information received from another person. Thus when actual confederates are used participants are likely to make decisions on the basis of normative or informational processes (Campbell & Fairey, 1989; Deutsch & Gerard, 1955). As Pratkanis (*in press*) explains, participants could either be conforming due to *informational* influences (e.g. if other people are doing it, it must be correct), or *normative* influences where they are confronted with two conflicting goals, either to answer correctly (i.e. in which case they would have to contradict misinformation provided by the confederates) or to maintain a positive relationship with the group (i.e. by conforming to the misinformation provided by confederates).

Yet surprisingly there has been little research which has compared participants' susceptibility to misinformation which is introduced by one, or more, witnesses. Aside from the study by Vrij, Pannell and Ost (2005) discussed below, only one other study, conducted by Dalton and Daneman (2006), has examined this issue. In Dalton and Daneman's experiment, participants discussed a video-presented criminal event in the presence of a confederate (who was introduced as a peer) who attempted to introduce misinformation into their discussions. Participants either discussed the event with the confederate in a dyad, or as part of a larger group of 3 to 5 participants plus the confederate. Dalton and Daneman (2006) found that misinformation effects were more pronounced in the dyad condition than in the group condition.

Thus research using actual confederates may better reflect the social psychological processes which occur when witnesses discuss and immediately evaluate information presented by co-witnesses in real life situations (Shaw, Garven & Wood, 1997). Although it is more difficult to ensure experimental control (because confederates must be trained to follow scripts), there are forensically-relevant

characteristics which can be manipulated directly and consistently using actual confederates.

Vrij et al. (2005), for example, examined whether participants would be more likely to conform to incorrect information provided by confederates dressed in dark clothing which is, in some contexts (e.g. police interviews), associated with dominance (Frank & Gilovich, 1988). Following Asch (1951), Vrij et al. (2005) assigned participants into one of four groups. Each group consisted of one confederate and one participant (low social pressure group), four confederates and one participant (high social pressure group) and the confederates were either wearing dark or light clothing. Participants were read aloud a narrative of a criminal event, after which they were asked to state out loud their answers to a series of related questions. Unbeknownst to the participant (who was always the last to answer), and in contrast to Dalton and Daneman's (2006) procedure, all confederates gave incorrect responses to a predetermined set of the questions. Vrij et al. (2005) found that participants in the four confederate / black clothing condition were more likely to conform with the incorrect responses provided by the confederates than participants in the one confederate / light clothing condition. In another recent study, Gabbert, Memon and Wright (2007) found that varying participants' beliefs about the quality of their own memory, by leading them to believe that their co-witness had seen a video-presented event for twice as long as they had, led to great memory conformity.

Are there other forensically-relevant characteristics of confederates, or cowitnesses, which might impact conformity? One such factor, and the focus of the present experiment, is the confidence of a co-witness. Research has consistently shown that, even though witness confidence and accuracy are only weakly related (Sporer, Penrod, Read & Cutler, 1995), or only related under certain circumstances (Brewer, 2006; Wells, Olson & Charman, 2002), people nevertheless rate highly confident witness as being highly believable (Leippe, Manion & Romanczyk, 1992; Wells, Ferguson & Lindsay, 1981; Wells & Murray, 1983; see also Lieppe, Eisenstadt, Rauch & Stambush, *in press*). Thus, as confidence is often incorrectly assumed to be diagnostic of accuracy, there may be something inherently persuasive in "being confident". In other words, people are likely to use confidence as a proxy for accuracy and incorrectly assume that that someone who is highly confident is also likely to be accurate. Indeed, Wright *et al.* (2000) found that the most confident member of a co-witness dyad was the most likely to persuade the other witness.

The present study therefore extended the experiment of Vrij *et al.* (2005) and investigated the role of social influence and confederate confidence on the accuracy and confidence of eyewitnesses. In line with the findings of Asch (1951) and Vrij *et al.* (2005) we predicted that participants would be more likely to conform to misinformation presented by three, as opposed to one confederate. In a novel extension, and in line with the findings from the eyewitness identification literature (Wells *et al.*, 1981), we predicted that participants would be more likely to conform to misinformation when it was presented by a confederate who claimed to be highly confident, than a confederate who claimed not to be confident. We also explored the confidence / accuracy relationship in order to examine the extent to which participants' responses were due to normative or informational influence. A positive correlation between confidence and accuracy would indicate that participants were knowingly giving incorrect responses (characterised by low confidence scores).

Method

Design

A 2 (number of confederates: one; three) by 2 (confidence of confederates: low; high) independent groups design was employed. Confederate confidence was manipulated as follows: in the 'low confidence' condition the confederate(s) was instructed to give a confidence score of 1 or 2 compared to the 'high confidence' condition where they were instructed to give a confidence score of 6 or 7. The dependent variables were participants' accuracy and confidence when the confederates gave incorrect answers.

Participants

Sixty undergraduate students participated, fifteen systematically allocated to each condition. There were 12 males and 48 females, aged 18-25 years old (M = 20.6 yrs, SD = 1.43 yrs). The confederates were all female students in the same age range. They were aware of the general aims of the study, but were blind to the specific hypotheses. A 2 (number of confederates: one; three) x 2 (confidence of confederates: high; low) Analysis of Variance revealed no differences in age of participant as a function of condition (all p's >.05). Although there were more female participants overall (n=48), χ^2 analysis revealed no association between gender and condition (both p's>.05).

Materials

A short clip (37s) of a staged mugging was filmed for the purposes of this study to provide a more realistic and forensically-relevant eyewitness stimulus event than has been used in previous social consensus studies (e.g. Roediger *et al.*, 2001; Vrij *et al.*, 2005). In the clip a female is seen talking to her friend and then walking off on her own, past a group of three men. A few seconds later, two of the men run after her and one steals her handbag whilst the other pushes her to the floor. A series

of eight questions about this clip were devised by the authors (see Appendix I for details).

Procedure

Participants were taken to a room in a University building. In the one confederate condition the participant entered the room first and the investigator then brought in the confederate who was introduced as another participant. In the three confederates condition one confederate was already present and the remaining two confederates were brought in after the participant. The participant was always seated to the immediate right of the investigator. All participants and confederates were asked to read and sign an informed consent form. Once the informed consent forms had been read and signed the following instructions were read aloud by the investigator:

"You will now be shown a short video of a staged crime. Once this task is complete I will ask you eight questions about the crime. Please answer out loud one at a time when you are asked to do so, and give as concise an answer as possible. Please do not ask questions about the video or discuss it with the rest of your group / co-witness since your answers must be based on what you have seen. After each question you give please state the level of confidence you have in your answer on a scale of one to seven; one being not confident and seven being extremely confident."

Participants and confederates then watched the film of the staged mugging.

They all then completed a distractor task (a word search) for five minutes.

The group (or dyad) were then asked eight questions in a clockwise direction beginning with the confederate to the immediate left of the investigator. This was to ensure that all the confederates gave their answers (and confidence levels) to each

question before the participant. Confederates gave correct responses to four of the questions (questions 2, 4, 5 & 6) and the same incorrect responses to the other four questions (questions 1, 3, 7 & 8). They responded with the same predetermined confidence scores for all eight questions (1 or 2 for 'low confidence' confederates and 6 or 7 for 'high confidence' confederates) (see Appendix I for details). The investigator recorded the participants' responses and confidence levels on a sheet of paper. At the end of this questioning phase the participants were debriefed and thanked for their time.

Scoring responses

Two dependent variables were derived from participants' responses: (i) the proportion of correct responses given by participants when confederates gave incorrect responses (scored from 0-1); and (ii) participants' mean confidence levels in their responses to questions when the confederate(s) gave incorrect answers (scored from 1-7).

Results

Overall, when confederates were answering correctly, participants also answered 93.75% (SD = 11.85) of questions correctly. Participants' mean confidence ratings for these questions was 5.20 (SD = 0.69). These data were, as expected, near ceiling and, as they were not the main focus of this experiment, will not be considered further. Of more interest, and the focus of the present experiment, were the effects on accuracy and confidence when confederates answered incorrectly. In this case participants only answered 62.92% (SD = 31.05) of questions correctly. Participants' mean confidence scores for these questions were also lower than their responses to questions which confederates answered correctly (M = 4.52, SD = 0.96).

To examine the effects of the number of confederates and confederate confidence on participants' accuracy and confidence scores when the confederates gave incorrect answers, a 2 (number of confederates: one; three) by 2 (confederate confidence: low; high) MANOVA was conducted. The dependent variables were (i) the proportion of correct answers given by the participant and (ii) participants' confidence. The number of confederates X confidence of confederates interaction was not significant for either of the dependent variables (all p>.05). There were significant multivariate main effects of the number of confederates (*Wilk's Lambda* = 0.74, $F_{4,50}$ = 4.23, p<.005, $partial \eta^2$ = .25) and the confidence of the confederates (*Wilk's Lambda* = 0.82, $F_{4,50}$ = 2.72, p<.05, $partial \eta^2$ = .17).

---insert Figure One here---

Participant accuracy: As shown in Figure 1, there was a main effect of the number of confederates on participants' accuracy ($F_{1,53} = 16.18$, p<.0005, partial $\eta^2 = .23$). Participants were significantly less accurate (i.e. gave the same incorrect answers as the confederates) in the condition where three confederates (M = .50, SD = 0.32), as opposed to just one confederate (M = 0.79, SD = 0.20), gave incorrect answers. As shown in Figure 1, there was a significant effect of the confidence of the confederates on participants' accuracy ($F_{1,53} = 3.53$, p<.05, partial $\eta^2 = .06$). Overall participants were less accurate when the highly confident confederates were giving incorrect responses (M = 0.54, SD = 0.33), compared to when the less confident confederates were giving incorrect responses (M = 0.71, SD = 0.28).

---insert Figure Two here---

Participant confidence: As shown in Figure 2, there was a significant effect of the number of confederates on participants' confidence scores ($F_{1,53} = 4.59$, p<.05, partial $\eta^2 = .08$). As shown in Figure 2, participants reported significantly lower

confidence in the three confederates condition (M =4.29, SD = 1.02), compared to the one confederate condition (M =4.78, SD =0.83). As shown in Figure 2, there was also a significant effect of the confidence of the confederates on participants' confidence ($F_{1,53}$ = 3.78, p=<.05, partial η^2 = .06). Participants were more confident when the incorrect information was presented by a highly confident (M = 4.78, SD = 0.72), compared to less confident confederate (M = 4.31, SD = 1.08).

Confidence / accuracy relationship: In order to investigate the relationship between participants' accuracy and their confidence for the responses where confederates answered incorrectly, a Pearson's Product Moment correlation was conducted. This indicated a significant positive correlation between participants' accuracy and their confidence scores when confederates gave incorrect responses (r = .31, p < .05). Thus, participants who were more inaccurate reported lower confidence scores and vice versa.

Discussion

The present experiment investigated the effects that a number of high or low confident confederates can have on an individual witness's testimony, particularly when they provide misinformation. Due to ceiling effects there were no effects of the number of confederates, or their confidence, on participants' accuracy or confidence to relation to the four questions that the confederates answered correctly. This is not surprising as non-misleading questions are easier to answer than leading or misleading questions (Schooler & Loftus, 1986). The following discussion thus focuses on the impact of our manipulation of the number of confederates, and their confidence, on participants' accuracy and confidence when the confederates answered incorrectly.

The number of confederates had an effect. Participants provided significantly fewer accurate responses when three confederates, as opposed to just one confederate, answered incorrectly. This replicates Asch's (1951) findings, as well as those of Vrij et al. (2005), and demonstrates again the power of the social consensus effect (Pratkanis, in press). These data do not support the findings of Dalton and Daneman (2006) who found that misinformation was more likely to be adopted in one-to-one discussions with a confederate, rather than in group discussions in which the confederate attempted to introduce misinformation. However, in their study they employed one confederate who attempted to influence the rest of the group (including the participant). Thus it is likely that the other group members acted as a buffer, inoculating participants against the misinformation they were attempting to introduce. In the present study, all the members of the group (the three confederates condition) answered incorrectly, thus exerting much stronger normative pressure on participants.

Our more novel manipulation centred on the confidence with which confederates reported incorrect details of the event. As predicted, this also had a significant impact on participant accuracy. Participants were significantly more likely to conform to the incorrect responses of confederates who expressed high, as opposed to low, confidence in their answers. These findings are consistent with the eyewitness identification literature that confident witnesses tend to be perceived as more accurate (e.g. Leippe *et al.*, 1992; Wells *et al.*, 1981; Wells & Murray, 1983; see also Brewer, 2006). It also supports the findings of Wright *et al.* (2000) who found that confidence ratings given by co-witnesses strongly predicted which response the dyad finally reported. However, the important caveat to their findings was that this relationship only appeared to hold for cases when a co-witness confidently claimed to have seen an accomplice. As Wright *et al.* (2000) note this shows that if a person confidently

claims to have seen something they are trusted more than if they confidently claim they did *not* see something (see also Wright, Loftus & Hall, 2001).

In addition to the effects on participants' accuracy we also looked at the effects of number of confederates, and their confidence, on participants' confidence. Our data showed that participants expressed significantly lower confidence when conforming to the incorrect responses given by three confederates, compared to just one confederate. This suggests that participants' responses to the questions the confederates answered incorrectly may have been due to normative influence (Campbell & Fairey, 1989; Deutsch & Gerard, 1955; Pratkanis, *in press*). In other words, the higher the number of confederates who answered incorrectly to a given item, the lower the participants' own confidence score, suggesting that the participant was aware they were answering incorrectly.

Interestingly, participants who conformed to incorrect information provided by highly confident confederates gave higher confidence scores themselves compared to participants who conformed to incorrect information provided by low confident confederates, irrespective of the number of confederates. This effect is difficult to disentangle but it does suggest some element of normative influence on participants' confidence scores. Again, because participants were required to give both their answers to the questions and their confidence scores out loud, it is likely that similar normative pressure guided these responses (i.e., the participant's response to the specific question, and the participant's response regarding their confidence). However, the effects on participant confidence cannot be due entirely to normative pressures. If they were then we would not have expected participants' confidence scores to be lower in the three confederates condition. One way to investigate whether this was the case would be to correlate participants' confidence scores with

confederates' confidence scores. However, as a consequence of the experimental design, the confederates deliberately gave a restricted range of confidence scores. Confederates in the 'low' confidence condition always gave scores of either '1' or '2', and those in the 'high' confidence condition always gave scores of either '6' or '7'. Thus it was not appropriate to compute this particular correlation.

The positive correlation between participants' confidence and their accuracy in relation to the items the confederates answered incorrectly also supports the notion that these responses were due to normative, rather than informational, influence. If participants were responding as a result of informational influence then we might not have expected any clear relationship to emerge between confidence and accuracy participants would give the incorrect answers because they genuinely thought the confederates were correct while they were mistaken. Thus one might predict that, if participants were conforming due to informational influence, they would be equally as confident, irrespective of accuracy. However, the positive correlation indicates that the participants were not confident in the incorrect answers they gave. One explanation is that they succumbed to normative influence and gave these inaccurate responses because they did not wish to contradict information given by the confederate(s). Of course, the causal chain is not entirely clear. It could be that participants were more confident because they knew they were accurate, or it could be that, because they were highly confident about certain items, or because they simply had stronger memories for these details which inoculated them against the effects of confederate influence.

As with all such studies, the effects of normative or informational influence are difficult to disentangle because the outputs (in terms of accuracy) are essentially the same. What we can conclude from the above is that participants will report

misinformation when faced with a number of confederates compared to just one. This demonstrates that well known social psychological processes also extend to memory judgements (Vrij *et al.*, 2005; Wright *et al.*, 2000). Again, these data support findings from studies which have investigated confidence effects on memory conformity using other methodologies and stimuli (e.g. Wright *et al.*, 2000).

These data also extend our understanding of the factors which may make confederates or, by extension, co-witnesses more persuasive (Gabbert *et al.*, 2007). It also suggests that some of these factors can be manipulated experimentally *in situ*. Previous work has manipulated the believability and credibility of co-witnesses by providing additional information about the co-witness, for example their age (Kwong-See, Hoffman & Wood, 2001) or status (Hoffman, Granhag, Kwong-See & Loftus, 2001) before participants are exposed to (mis)information. As noted by Shaw *et al.* (1997), that methodology focuses on how co-witness information affects subsequent memory reports, rather than the immediate effects of confederate misinformation which was the focus of this experiment. It would therefore be interesting to investigate these immediate effects more fully. For example, would participants be more or less likely to conform in the presence of confederates of different status (e.g. police officers versus peers).

Future research should nevertheless attempt to improve the ecological validity of this method still further, perhaps by providing plausible reasons why certain confederates are more confident than others (e.g., they were closer to the event, have demonstrably better / worse memories than the participant; see Gabbert *et al.*, 2007). In addition research could address the problem of normative or informational influence in a more un-biased manner. As participants' confidence judgements could have been subject to normative pressures in the present experiment, future work

should adopt methodologies that ameliorate these effects. For example, participants could be asked to make two separate confidence judgments – one in public and a second in private (Wright *et al.*, 2005). Any differences in these two sets of confidence judgements might reveal the extent of normative pressures on participants when they are in the presence of the confederates.

Another avenue for future research, which would speak to the issue of normative or informational pressures, would be to examine the longevity of these kinds of conformity judgements. For example, Shaw *et al.* (1997) found that participants incorporated incorrect co-witness information into their own accounts of a robbery, and that this effect continued into a memory test 48 hours later. Thus Shaw *et al.* (1997) demonstrated both public and private acceptance of the misinformation they were exposed to. If the conformity effects had not carried over into the subsequent test phase then that would be reasonably strong evidence that participants were succumbing to normative, rather than informational, pressures in the immediate testing phase.

A possible limitation of the experiment was that question content was not counterbalanced in this study – thus confederates always answered the same questions correctly, or incorrectly. Care was taken, however, to ensure an equal number of central and peripheral details. Care was also taken to ensure that the questions answered incorrectly did not differ in plausibility or schematic consistency (see Appendix I for details). Ideally it would have been preferable to have eliminated the possibility of question-specific confounds entirely by counterbalancing questions so that confederates answered each one correctly and incorrectly an equal number of times. However, the relative complexity of the present study, and the use of live

confederates (each of whom would have needed to memorise and accurately reproduce at least two sets of answers) meant that this was not practical.

Conclusion

The present experiment demonstrated that the accuracy and confidence of eyewitnesses were susceptible to social consensus effects. Specifically, the more confederates who answer incorrectly and the more confident they are, the more likely participants are to conform to incorrect information they provide. Although participants generally expressed lower confidence in their incorrect responses in the presence of three confederates, they gave higher confidence scores themselves if the confederates were also highly confident (despite the fact that the confederate(s) were no more accurate). This means that police officers cannot treat information from co-witnesses as independent (Wright *et al.* 2000). As our experiment demonstrated, this independence is also likely to be undermined by the number of the co-witnesses and the confidence they hold about their own version of events.

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Figure 1. Participants' proportion accuracy as a function of number and confidence of confederates(s). Error bars show one standard deviation.

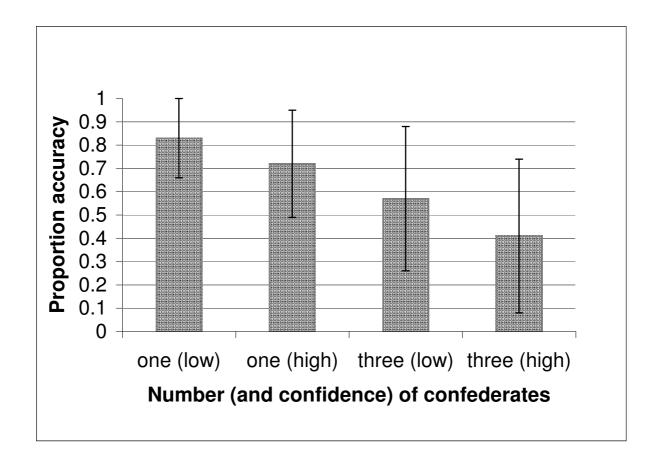
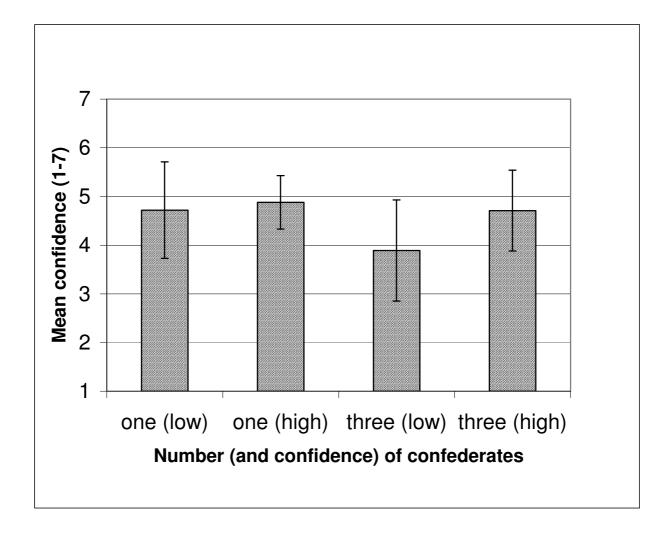


Figure 2. Participants' mean confidence scores as of number and confidence of confederates(s). Error bars show one standard deviation.



Appendix I: Questions asked, confederate answers and confederate confidence scores.

Confederates gave correct answers to questions 2, 4, 5, and 6, and incorrect answers to questions 1, 3, 7 and 8. Confidence was manipulated by instructing confederates to give high (6 or 7) or low (1 or 2) scores to each of their answers. The answers given by confederates are given in brackets, followed by the confidence ratings for the low and high confidence conditions respectively, and whether the item was Central or Peripheral (Ellis & Ashbrook. 1988). The order of the questions follows the chronology of the video clip.

- 1. Was the victim wearing a black jacket or a short sleeved top? (Black jacket; 1; 6; Central).
- 2. Briefly describe what the victim was doing before she walked off on her own (Talking to a friend; 1; 6; Peripheral).
- 3. How many men did the victim walk past before she was attacked? (Four; 2; 7; Peripheral).
- 4. Did all of these men take part in the attack? (No; 2; 7; Central).
- 5. One of the attackers was seen physically grabbing her bag; was he wearing a grey jacket, or a white jacket? (Grey; 2; 6; Peripheral).
- 6. What colour was the handbag that was stolen from the victim? (Brown; 1; 7; Central).
- 7. Another man was seen assisting in the attack; was he of white or black ethnic origin? (White; 2; 7; Central).
- 8. Was he wearing a black tracksuit, or blue jeans? (Blue jeans; 1; 6; Peripheral).