What's left unsaid: How nonverbal influence compares to verbal influence

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Eyewitnesses' memory reports can be altered when ambiguous post-event information is presented verbally during interviews. While recent research has identified that gestures can also act a source of influence in eyewitness interviews, it is unknown whether nonverbal suggestions can exert an influence to the same magnitude as those made verbally. To investigate this, 92 adults were interviewed about a crime video and provided with either verbal (speech) or nonverbal (gesture) suggestions during questioning that provided either factual or misleading information about the scene. The results revealed that both differed from controls, and that gestures exerted a similar level of influence as speech: As with speech, gestures led participants to giving both correct and incorrect responses. These results highlight that misinformation conveyed covertly through gestures as a form of suggestion that is comparable to overt verbal influence despite differences in the way in which they convey information.

Keywords: verbal influence, nonverbal influence, gestures, misinformation, eyewitness memory

Introduction

A large body of research highlights the implications of misinformation on eyewitness memory. Biased questioning from interviewers can lead witnesses to misremember certain details of an event and cause them to report false information as a result (see Loftus, 2005, for a review). The vast majority of eyewitness memory research identifies speech as the source of influence (Harris, 1973; Loftus & Palmer, 1974; Loftus & Zanni, 1975) although, increasingly, studies have found that misinformation can also occur outside of speech; for example, through doctored images and photographs (Frenda, Knowles, Saletan, & Loftus, 2013; Wade, Garry, Read, & Lindsay, 2002). Additionally, recent research has revealed that misinformation can be communicated nonverbally, through hand gestures, and these gestures have been found to exert an influence on both adults (Gurney, Pine, & Wiseman, 2013) and children (Broaders & Goldin-Meadow, 2010). While the effects of verbal misinformation are well stated, *gestural misinformation* is a relatively new concept in eyewitness research and the extent to which it compares to verbal misinformation as a form of influence is unclear. The present research addresses this by considering how the two forms of misinformation differ and whether suggestions made to eyewitnesses nonverbally through gesture are as salient as those made verbally.

Speech and gesture vary greatly as conveyers of information. While speech is planned, gestures occur spontaneously (Krauss, 1998; McNeill, 1992) and, due to their role in articulating speech and thought (Chu & Kita, 2008; Kita, 2000), are often produced without communicative intent (Krauss, Chen, & Gottesman, 2000). Despite this, gestures are still effective at communicating information, and listeners glean extra meaning from speakers who accompany their speech with gestures (Beattie & Shovelton, 1999; Goldin-Meadow, Alibali, & Church, 1993). While spontaneous gestures often serve to supplement speech, they

can also convey information independently (Cassell, McNeill, & McCullough, 1999; Kelly, Barr, Church, & Lynch, 1999; Kendon, 1980) and information from these gestures can become integrated into the speaker's overall message (Goldin-Meadow, 1998; McNeill, Cassell, & McCullough, 1994).

Despite differences in the way in which gestures communicate information, there is evidence that they can exert similar misinformation effects as suggestions made verbally. In the studies by Gurney, et al (2013) and Broaders & Goldin-Meadow (2010), participants were found to incorporate suggestions made through gesture into their original memory of an event. For instance, in the study by Gurney et al, participants that were asked '*do you remember any distinguishing features?*' were significantly more likely to report a man having facial hair if this question was accompanied by a 'beard' gesture. The results from these studies offer provisional support that misleading post-event information can be introduced through gesture as it can through speech. However, despite the insights offered by these studies, it is unclear at present how powerful nonverbal influence is in comparison to verbal influence and whether the two modalities influence through a similar process.

The effects of misinformation are largely dependent on source monitoring. Eyewitnesses often evaluate the credibility of the source before accepting the information presented by it (Dodd & Bradshaw, 1980; Vornik, Sharman & Garry, 2003) and wittingly subscribe to suggestions from an interviewer when they are seen as trustworthy or of high authority (Skagerberg & Wright, 2009; Smith & Ellsworth, 1987). Similarly, when eyewitnesses are warned against influence from police officers that can bias their judgements, this influence is reduced (Lampinen, Scott, Pratt, Leding, & Arnal, 2007). While the effects of verbal misinformation are mediated by source monitoring, gestures may not be subject to the same credibility assessments, as listeners do not subscribe to information conveyed by

them overtly. Gestures are not often attended to in conversation (Gullberg & Holmqvist, 2002, 2006; Gullberg & Kita, 2009) and listeners show little awareness of when information has been conveyed to them nonverbally: Kelly et al. (1999) report that when presenting the sentence *'my brother went to the gym'* with a 'shooting a basketball' gesture, listeners not only extracted the critical 'basketball' information from gesture, but often remembered this as being part of speech. Thus, while gestures can convey information that carries the same semantic value as information in speech, they often provide listeners with this information without trace of having done so.

The capacity of gestures to suggest novel information (and do so covertly) appears to make them ideal candidates for influence in eyewitness interviews. While recent research confirms a gestural misinformation effect in interviews with adults (Gurney, et al., 2013) and children (Broaders & Goldin-Meadow, 2010), it is unclear as yet how the saliency of this nonverbal influence compares to verbal influence. Can information portrayed to witnesses nonverbally, through gesture, be as likely to skew memory as information conveyed overtly through speech? Forming a comparison between verbal and nonverbal misinformation would not only give new insight into the communicative value of gestures but would also reveal whether the saliency of misinformation effects differ in the absence of source monitoring. The current study explored this by presenting participants with factual or misleading information across two mediums; speech (verbal) or gesture (nonverbal) and their responses to a series of questions on crime scene footage were compared with a control (no influence) condition.

Method

Participants

The participants were 92 adults (*M* = 28.78, *SD* = 12.88), 28 males and 64 females, the majority of whom were students who were awarded course credit for taking part.

Materials

A short (30 second) video of a theft at a bus stop was prepared as the stimulus. The video showed a girl waiting in a bus shelter when a man entered the scene, stole a phone from the bag on the ground beside her and then exited the scene. A few bystanders were also present in the video to ensure the scene appeared as real to life as possible. The video was presented to participants on a laptop screen.

Design & Procedure

Participants were told they were taking part in a memory experiment and would be required to answer questions on a video. After watching the video and completing a short five minute distracter task, participants took part in a semi-structured interview. The interview comprised five critical questions concerning the girl's hair style, what item was stolen, where the man put this item, what the bystander was doing and what shape was presented on a nearby poster. For each of these questions, the interviewer deliberately used biased wording or hand gestures to present critical information to participants prior to asking them to report what they had seen. The type of information (factual, misleading) and method of presentation (verbal, nonverbal) created four different questioning types; *verbal factual (VF), verbal misleading (VM), nonverbal factual (NVF), nonverbal misleading (NVM)* with a fifth control condition (no information presented). For the verbal questioning conditions, the critical information (either factual or misleading) was presented through speech (e.g. *'the victim was*

using a phone') and in the nonverbal questioning conditions was presented through gesture while speech remained unbiased (e.g. *'the victim was using an object'* + 'phone' gesture). After providing the participant with critical information, the interviewer asked the participants to summarise what they remember about that portion of the video before asking them the critical question specifically. The interviewer rehearsed the performance of the gestures to ensure they appeared as natural as possible and did not distract from speech. A pilot study conducted on eight undergraduates (age $M = 20.63$, $SD = 6.63$) confirmed that the questioning was clear and that the gestures did not draw suspicion from participants. The questioning format was used for both factual and misleading conditions, with the critical information in the *factual* conditions being congruent with the events of the video and the information in the *misleading* conditions presenting false information. The control group used the same unbiased speech as the nonverbal conditions with no gestures. Table 1 summarises all questioning conditions across the five critical questions.

Insert Table 1 about here

All participants were asked the five critical questions and were presented with all five questioning conditions (one question per questioning condition) throughout the interview. Therefore, across the interview, all participants answered one verbal factual question, one verbal misleading question, one nonverbal factual question, one nonverbal misleading question and one control question. To ensure that questioning conditions fell on different questions across the sample, five different versions of interview transcripts were prepared to counterbalance the order in which the questioning conditions were presented. Participants were assigned randomly to one of these five transcripts. Allocating conditions in this way allowed a robust method of testing whereby all participants were subject to every questioning technique and would not become suspicious of any one form of misinformation throughout

the experiment. Therefore, this method allowed between-subjects comparisons to be made between questioning conditions for each individual question and within-subject comparisons to be made on the effects of the questioning conditions across the interview overall.

Throughout the interview, participants gave their responses to each of the questions verbally and the interviewer wrote down these answers. Responses were logged categorically as either congruent with factual information (correct) or congruent with misleading information (incorrect). Participants were prompted once to give an answer for each question but were free to give a negative response ('don't know') if they were unsure. Thus, participants gave either a 'correct', 'incorrect' or 'don't know' response for all questions. No other responses were given. All responses were clarified with participants at the end of the interview and no participants expressed knowledge of the study rationale. The interviews were filmed to verify the interviewer did not gesture for the verbal or control questions and to ensure consistency in questioning across all participants.

Results

Responses to individual questions

The first set of analyses consider how the frequency of responses (correct, incorrect) varied between the questioning conditions (*VF, NVF, VM, NVM*, control) for each of the five critical questions individually. For any one question, participants gave their response from one of the questioning conditions independently, thus between-subject comparisons were used. A chi-square analysis retrieved significant associations between response and condition for all five questions ($p < .01$ for all) confirming that responses were affected by the type of questioning. The data from all five critical questions were then collapsed and studied in one

overall data set. Overall, when participants were presented with accurate, factual information they were more likely to give the correct response (75.3% for both *VF* and *NVF* conditions) compared to when they were given misleading information (31.9% and 39.1% for the *VM* and *NVM* conditions respectively). Responses for the control condition fell in between (57.6%). Subsequently, when participants were presented with misleading information they were more likely to give the incorrect answer (*VM*: 50.5%, *NVM*: 39.1%) than when they were given factual information (*VF, NVF*: 8.6%) with responses for the control condition again falling in between (18.5%). These data are summarised in Figure 1.

Insert Figure 1 about here

Owing to the nature of this collapsed data set (where each participant contributed one data point to each condition) a within-subjects analysis was conducted to consider how participants' responses varied across the five questioning types. A small subset of participants (n = 24) who gave a positive (correct or incorrect) response to all five questions were considered and those that returned a negative ('don't know') response for any of the five questions were excluded. This subset of participants again were more likely to give an accurate answer when presented with factual information, either verbally (80%) or nonverbally (88%), as they were for their control question (80%), and more likely to give an incorrect answer when presented with misleading information, either verbally (60%) or nonverbally (56%). A Cochran's Q test confirmed an association between response and condition to be significant; $Q(4) = 20.190$, $p < .001$. Therefore, the number of correct and incorrect participants' responses varied according to the type of questioning used throughout the interview.

Comparison between verbal and nonverbal influence

Comparisons between the verbal and nonverbal conditions were then examined individually. Significant between-subjects associations were found between the verbal questioning conditions alone (*VF, VM* and control) and response (correct, incorrect) for all of the critical questions individually ($p < .01$ for all except *hair style*; $p = .01$). Thus, questions conveying factual information led participants into giving a correct answer whilst those conveying misleading information led them into giving an incorrect answer. This was true of all five critical questions, confirming the well-established verbal misinformation effect.

To examine where a similar effect was present when factual or misleading information was conveyed through gesture, the same analysis was conducted for the nonverbal conditions alone (*NVF, NVM*, control). Across all questions, more correct responses were made in the factual condition and more incorrect responses were made in the misleading condition. Significant ($p < .01$) associations between condition and response were found for two of the critical questions (*hair style* and *object taken*), two others (*pocket* and *poster shape*) were close to significance ($p = .06$ and $p = .08$ respectively) though the *bystander action* question was not ($p = .13$).

The responses for all questions were again collapsed in an overall data set and a within-subjects comparison was conducted between the verbal conditions alone (*VF, VM,* control): A subset ($n = 44$) of participants answered all three questions with a positive (correct, incorrect) response and a Cochran's Q test revealed their responses varied significantly across these conditions; $Q(2) = 26.72$, $p < .001$. To investigate a misinformation effect specifically, a McNemar's test was conducted between just the verbal misleading and control group and a significant effect was found; X^2 (2, $n = 56$) = 1.08, $p = .003$. Similarly, a comparison was made between the responses of the nonverbal groups alone (*NVF, NVM*,

control) with a subset comprising 45 participants and were found to vary significantly throughout the nonverbal questioning conditions; $Q(2) = 19.68$, $p < .001$. A McNemar's test again confirmed an effect between just the nonverbal misleading and control groups; X^2 (2, $n = 52$) = 9.58, $p = .004$ (though with one data point < 5). Therefore, both verbal and nonverbal questioning exerted an influence on the participants' responses throughout the interview.

Finally, to compare the influence exerted by the verbal and nonverbal groups directly, the responses given by participants in the respective factual and misleading conditions were considered. When comparing the two factual (*VF*, *VNF*) conditions in a subset sample that answered all questions ($n = 64$), participants appeared just as likely to give a correct answer if it was conveyed to them nonverbally (90%) as it was verbally (91%). Owing to the few participants that gave an incorrect response, an inferential test comparing these two groups was not possible. When considering a comparison between the verbal misleading (*VM*) and nonverbal misleading (*NVM*) groups, participants gave more incorrect responses when misled nonverbally (54%) than when misled verbally (41%). A McNemar's test however revealed no significant difference between these conditions; X^2 (2, $n = 65$) = 1.63, $p = .201$. Therefore, misinformation presented to participants appeared just as likely to influence their responses if conveyed verbally or nonverbally.

Discussion

This study asked whether information conveyed through hand gestures in eyewitness interviews could exert an influence comparable to information conveyed through speech despite differences in the way in which they convey information. These results suggest they can: Gestures were as likely to prompt participants into reporting accurate, factual

information and reporting inaccurate, misleading details about the scene as the same information presented overtly through speech. When the two forms of influence were compared, there were little differences between them. These findings contribute to the growing literature that gestures serve as a powerful tool in communication (Beattie & Shovelton, 1999; Goldin-Meadow, 1999) such that they can affect the accuracy of eyewitnesses' judgements (Broaders & Goldin-Meadow, 2010; Gurney, et al., 2013). However, this study adds that, despite the covert nature through which gestures communicate, they appear just as likely to mislead eyewitnesses as overt suggestions made through speech.

How similar is the process of nonverbal influence to verbal influence? It could be argued that gestures conveying high semantic content merely provide an indirect route to the standard effect of misinformation. If memories are reconstructed rather than replayed (Loftus & Hoffman, 1989), any post-event information introduced to witnesses after an event could become incorporated into their original memory of the event. Since people integrate information from gesture into speech (Cassell, et al., 1999; Goldin-Meadow, 1998), witnesses may use information from gestures to reconstruct memory through a similar process to speech. Therefore, it would make little difference whether this post-event information is conveyed verbally or nonverbally. While this may serve as an explanation for how accuracy rates were similar across conditions, it is important to note that the mechanisms behind gestural misinformation are not comparable to those of verbal misinformation. If nonverbal misinformation is incorporated into an eyewitness' representation, it is done so through a more covert process: Gestures are not readily noticed in conversation (Gullberg & Holmqvist, 2002, 2006), even when fixated (Gullberg & Kita, 2009), and listeners often cannot identify gesture as the source of information retrospectively (Kelly, et al., 1999). This is an important consideration to make as the success of gestures in manipulating memory reports could be

attributed to a lack of source monitoring. If listeners have little awareness of when information from gesture has been offered to them, they subsequently have no opportunity to assess the validity of such suggestions intuitively, which is of importance when mediating the effects of misinformation (Dodd & Bradshaw, 1980; Semin & Poot, 1997; Vornik, et al, 2003). Therefore, while gestures share the same capabilities to influence as speech, they do so through a more subtle, implicit process. This study is the first to provide evidence that gestures do provide misinformation effects comparable to those made through speech, and invites future research to consider the role of source monitoring between these modalities further.

The implications of conveying information through gestures should also be considered. Interviewers have difficulty resisting the use of leading information (Ceci & Bruck, 1993) but, while speech can be controlled, gesture production is more automatic and spontaneous (Krauss, 1998; McNeill, 1992), often occurring outside of the speaker's awareness. Whilst interviewers can be careful to avoid conveying critical information through speech, they may still 'leak' information nonverbally. Research has revealed that other nonverbal behaviours can exert an influence on eyewitnesses in interviews (Gurney, Vekaria & Howlett, 2013) as well as police line-ups (Garrioch, & Brimacombe, 2001; Haw & Fisher, 2004), even when such influence is unintentional and unknown. This study provides further support that the subtle communicative effects of gestures may also contribute to eyewitness manipulations and expresses the importance of being mindful of this in future practice.

In light of these findings, this study adds to the concerns of previous research in this area that video recording of interviews should be arranged such that interviewers and witnesses are both clearly visible so gestures can be identified as a source of influence (Broaders & Goldin-Meadow, 2010; Gurney, et al, 2013). Since an eyewitnesses' reports of

gestural influence may not be reliable, the monitoring of gesture would go some way towards ensuring the accuracy of eyewitnesses' judgements and ensuring their testaments are the not the result of memory manipulation.

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Table 1: Extracts from interviewer transcripts showing questioning types for all critical questions

Question	Verbal		Nonverbal		Control
	Factual	Misleading	Factual	Misleading	
Hair style	Did you see that the girl had her hair up?	Did you see that the girl had her hair down?	Did you see how the girl had her hair? + 'HAIR UP' GESTURE	Did you see how the girl had her hair? + 'HAIR DOWN' GESTURE	Did you see how the girl had her hair?
Stolen item	The victim was using a phone	The victim was using an iPod	The victim was using an object + 'PHONE' GESTURE	The victim was using an object + 'IPOD' GESTURE	The victim was using an object
Pocket	The man put the item in his jacket pocket	The man put the item in his jean pocket	The man put the item in his pocket + 'JACKET POCKET' GESTURE	The man put the item in his pocket + 'JEAN POCKET' GESTURE	The man put the item in his pocket
Bystander action	The bystander was busy reading a book	The bystander was busy reading a newspaper	The bystander was busy doing something + BOOK GESTURE	The bystander was busy doing something + NEWSPAPER GESTURE	The bystander was busy doing something
Poster shape	There was a poster with a circle on it	There was a poster with a triangle on it	There was a poster with a shape + 'CIRCLE' GESTURE on it	There was a poster with a shape + 'TRIANGLE' GESTURE on it	There was a poster with a shape on it

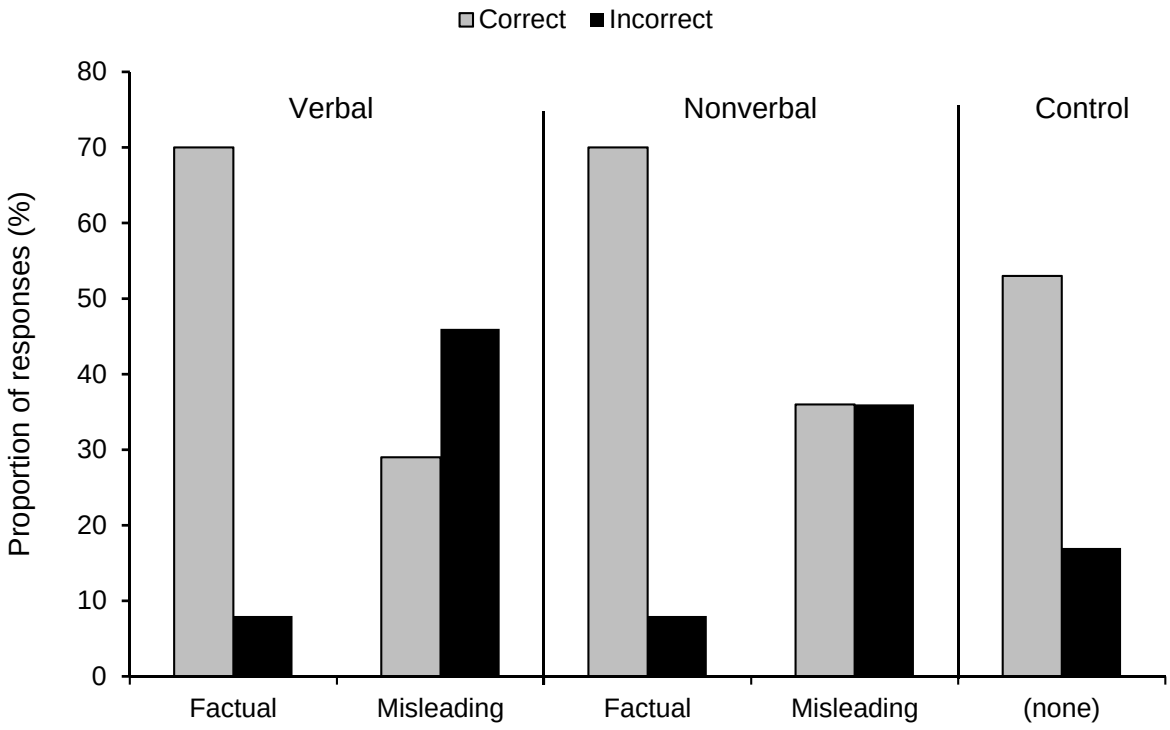

Figure 1: Overall frequency of responses across all questioning conditions